THE IMPACT OF CORPORATE GOVERNANCE ON THE EUROPEAN BANKING SECTOR: THE CASE OF THE 2007-2008 FINANCIAL CRISIS

by

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Biographical Note

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In December 1999, Catarina began her academic career as a lecturer at Polytechnic Institute of Bragança, teaching Finance and Entrepreneurship. At this institution, she held several other posts, including Chair of the Business Siences Departament. Catarina also taught at the National University of East Timor, at the *Instituto Superior Politécnico de São Tomé e Príncipe*, *São Tomé e Príncipe* University and, during the period of her PhD thesis data collection, at the University of Greenwich, UK.

Catarina´s PhD thesis project was awarded with a scholarship from FCT – *Fundação para a Ciência e a Tecnologia* (Portuguese Foundation for Science and Technology) under the *Programa de Apoio à Formação Avançada de Docentes do Ensino Superior Politécnico.*

Parts of the PhD research were accepted and/or presented at several conferences namely the 2011 Financial Management Association European Conference – Doctoral Student Consortium (Porto, Portugal), the 10th International Conference on Corporate Governance – Corporate Governance and Universal Acceptance: Taking Stock on Progress and Indicators of Future Trends (Birmingham, UK), the Portuguese Finance Network 7th Finance Conference (Aveiro, Portugal) and the 7th International IFABS Conference – The Future of Financial Institutions and Markets: Navigating the Challenges Ahead (Hangzhou, China). Moreover, the first and second papers of this thesis are already in a process of submission to academic journals.

During the PhD programme, Catarina has also attended a number of short courses and several academic seminars on finance.

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Abstract

This thesis is composed of three papers aimed at contributing to the understanding of the role of corporate governance in the European banking sector in the context of the 2007-2008 financial crisis, using a sample of 72 publicly listed European banks. Specifically, these papers analyse the impact of corporate governance mechanisms on the performance of banks, on the likelihood of banks participating in a bailout programme and on risk-taking by banks, using different econometric estimation methods.

The first paper investigates the impact of several characteristics of the board of directors on the performance of banks during the crisis period. As not all banks across Europe performed equally poorly, albeit exposed to similar macroeconomic conditions, it is very relevant to examine whether, and to what extent, the characteristics of the board explain the performance of banks during the crisis or, put differently, how the better-performing banks during the crisis differed, in terms of board characteristics, from the other banks before the crisis.

The second paper examines the determinants of European banks' bailouts following the financial crisis. The numerous and expensive public support programmes to save troubled banks call for a clear identification of the bailout determinants in the banking sector. The results obtained can, therefore, have important public policy implications in helping regulators and other public authorities avoid costly bailouts.

The third paper analyses the influence of bank corporate governance on their risk-taking. The importance of risk-taking by banks in the crisis context and the renewed focus on corporate governance justify the relevance of the paper. Additionally, the analysis is replicated for the period before the crisis in order to test whether such influence depends on macroeconomic conditions.

Resumo

Esta tese é composta por três artigos que visam contribuir para a compreensão do papel do *corporate governance* no setor bancário europeu no contexto da crise financeira de 2007-2008, utilizando uma amostra de 72 bancos europeus cotados. Concretamente, estes artigos analisam o impacto dos mecanismos de *corporate governance* no desempenho dos bancos, na probabilidade dos bancos participarem num programa de resgate e na assunção de risco pelos bancos, utilizando diferentes métodos econométricos de estimação.

O primeiro artigo investiga o impacto de diversas características do conselho de administração no desempenho dos bancos durante o período da crise. Como nem todos os bancos tiveram desempenhos igualmente pobres, apesar de expostos a condições macroeconómicas similares, é muito relevante examinar se, e em que medida, as características do conselho de administração explicam o desempenho dos bancos na crise, ou, por outras palavras, como os bancos com melhor desempenho na crise diferiam, em termos das características do conselho de administração, dos outros bancos antes da crise.

O segundo artigo analisa os determinantes dos resgates dos bancos Europeus na sequência da crise financeira. Os numerosos e dispendiosos programas públicos de apoio para salvar bancos em dificuldades exigem uma clara identificação dos determinantes dos resgates no sector bancário. Os resultados obtidos podem, portanto, ter importantes implicações em termos de políticas públicas, ajudando reguladores e outras autoridades públicas a evitar dispendiosos resgates.

O terceiro artigo analisa a influência do *corporate governance* dos bancos na sua assunção de risco. A importância da assunção de risco pelos bancos no contexto da crise e o renovado foco no *corporate governance* justificam a relevância do artigo. Adicionalmente, a análise é replicada para o período antes da crise de modo a testar se tal influência depende das condições macroeconómicas.

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Abbreviations

Chapter 2

BHCs – Bank Holding Companies

CEO – Chief Executive Officer

FID – Foreign Independent Directors

SOX – Sarbanes-Oxley Act

UK – United Kingdom

US – United States

WLS – Weighted Least Squares

Chapter 3

BCBS – Basel Committee on Banking Supervision

BIS – Bank for International Settlements

CEO – Chief Executive Officer

EU – European Union

GDP – Gross Domestic Product

LM – Lagrange Multiplier

NPLs – Non-Performing Loans

OLS – Ordinary Least Squares

TARP – Troubled Asset Relief Program

US – United States

VIF – Variance Inflation Factor

Chapter 4

2SLS – Two-Stage Least Squares

3SLS – Three-Stage Least Squares

BHCs – Bank Holding Companies

CEO – Chief Executive Officer

CRO – Chief Risk Officer

OLS – Ordinary Least Squares

US – United States

Chapter 5

BCBS – Basel Committee on Banking Supervision

CEO – Chief Executive Officer

CRO – Chief Risk Officer

CHAPTER 1

INTRODUCTION

1 INTRODUCTION

1.1 Motivation and research purpose

The 2007-2008 financial crisis has been described as the most serious crisis since the Great Depression (Brunnermeier, 2009; Eichengreen and O'Rourke, 2010; Beltratti and Stulz, 2012) with important effects on the real economy, posing challenges to economists, regulators and policymakers (Gorton, 2009). In fact, the United States subprime market crisis had a major impact on financial institutions and banks all over the world: fall in market capitalisation, liquidity problems, defaults and bailouts. Many renowned academics, economists, public authorities and several observers have argued that poor governance contributed to, or even caused, the collapse of an impressive number of large banks throughout the world. Corporate governance is generally defined as the set of mechanisms for addressing agency problems and controlling risk within the firm and so, it is not surprising that the importance of the effectiveness of corporate practices in the banking sector has been emphasised. Given the unique universal harm caused by the crisis, one has to wonder whether corporate governance mechanisms, namely the board of directors, correctly executed their role and did all that was expected of them.

Although the need to improve the existing instruments and develop new mechanisms to minimise the losses associated with the potential conflicts of interests among participants in corporate structure had long been advocated, the global financial crisis brought into the public domain, with special focus and widespread concerns, the issue of the weak corporate governance, in particular in the banking sector. This increased interest on governance motivates to analyse whether, and to what extent, governance is linked to the 2007-2008 financial turmoil.

In this manner, the aim of this thesis is to provide an in-depth analysis of the impact of corporate governance mechanisms on the European banking sector in the context of the 2007-2008 financial crisis.

The chosen research focus is both interesting and important due to various factors.

First, "*the panic should be a momentous event for economic research*" (Gorton, 2009, p. 11), so the 2007-2008 financial crisis constitutes an obvious natural event for

research that must be carefully analysed. Financial crises are devastating, thus understanding if, and how, governance can help banks to minimise their negative impact is of crucial importance.

Second, when dealing with governance issues most studies exclude financial firms from their sample. Thus, we know very little about the effectiveness of banking firm governance (Adams and Mehran, 2012), whose understanding has become even more important in the context of the financial crisis. In addition, the European context is sparsely analysed by the literature, being even more scarce the existence of European cross-country studies.

Third, the importance of banks in the economy[1] and the nature of their activity (Andres and Vallelado, 2008), as well as the significant costs that the failures in bank governance can cause (Pathan and Faff, 2013), make the analysis of the governance mechanisms in the banking sector simultaneously highly specific and important. Banks are "special" financial institutions creating distinct corporate governance challenges[2] (Staikouras et al., 2007). There are at least four particularities of banks that make them "special" and justify a separate analysis: greater opaqueness (Caprio and Levine, 2002; Morgan, 2002; Levine, 2004; Mülbert, 2009; Becht et al., 2011; de Haan and Vlahu, 2016; John et al., 2016), greater complexity (Andres and Vallelado, 2008; Becht et al., 2011; de Haan and Vlahu, 2016; John et al., 2016), greater government regulation (Prowse, 1997; Caprio and Levine, 2002; Adams and Mehran, 2003; Levine, 2004; Adams, 2010; de Haan and Vlahu, 2016; John et al., 2016) and deposits insurance (Morgan, 2002; Becht et al., 2011). These attributes can weaken many traditional governance mechanisms in that they may interfere negatively with the way in which the usual corporate governance mechanisms work. First, banks are generally more opaque than non-financial firms. The quality of bank loans as well as the quality of other bank' assets are not readily observable, which makes it difficult to accurately assess the risks they bear. Second, the complexity of the banking business increases the asymmetry of information and diminishes the capacity of stakeholders to monitor the decisions of

[1] Banking institutions are especially well suited to minimising transaction costs and adverse selection and moral hazard problems. This is, why banks are "special" and play such an important role in the financial system (Mishkin, 2006).

[2] Consistently, Adams and Mehran (2003) and Macey and O'Hara (2003), for example, emphasise the importance of taking differences in governance between banking and non-banking firms into consideration.

bank managers. Third, due to the vital role of banks in economic development and prosperity, these entities are heavily regulated and supervised. Fourth, the specific nature of banking makes it susceptible to greater moral hazard problems. Despite the positive effect of deposit insurance on preventing depositor runs, this can also encourage excessive risk-taking by banks. When protected, the depositor has little incentive to monitor the bank's activities and withdraw funds if the bank is taking on too much risk. Moreover, excessive bank size can also exacerbate important moral hazard problems (the problem known as "too-big-to-fail").

Finally, our research offers insights not only to bank directors, but also to policymakers and bank regulators and other public authorities by showing whether governance mechanisms matter in especially adverse macroeconomic conditions. Although some of them may not be of much importance on a day-to-day basis they can, nevertheless, matter in a crisis situation.

1.2 Sampling procedure and composition

Our sample consists of 72 publicly listed banks from 17[3] European countries. We use the following criteria to compile our sample. First, we restrict our sample to European banks that were publicly listed at the end of December 2005 that is, listed, at least, for the whole of 2006 (so, at least one complete year before the beginning of 2007) and not delisted during the crisis period. This results in 191 banks. Second, we restrict our sample to banks with common shares traded on a regulated market and that are not a subsidiary of a bank already included in the sample so as to prevent duplication of data. These restrictions reduce our sample to 164 banks. Third, we restrict our sample to banks that are covered by BoardEx, our data source on board information. Additionally, we use Datastream and Thomson Financial. While BoardEx is the leading database on board composition of publicly listed firms, only a limited number of European banks are covered in the database. So, our final sample consists of

[3] Austria, Belgium, Cyprus, Denmark, Finland, France, Germany, Greece, Italy, Ireland, the Netherlands, Norway, Portugal, Spain, Sweden, Switzerland and the United Kingdom. We began by analysing thirty countries but in thirteen of them no bank met all the criteria, so they were excluded from the sample.

72 publicly listed banks. Nevertheless, our sample is representative as it corresponds to 43.9% of total banks that meet our criteria.

1.3 Structure of the thesis

Building on the three pillars of the research which are governance, crisis and banking sector, three papers were developed, offering diversity as regards research theme/focus (performance, bailouts and risk-taking), contributions to the existing literature, policy implications and methods of estimation used. Such diversity strongly enriches the thesis.

The first paper "Supervisory Boards, Financial Crisis and Banks' Performance: Do the Characteristics of the Board Matter?", presented in Chapter 2, investigates the impact of various board characteristics, such as different dimensions of diversity, before the crisis on the performance of banks, measured by equity return, during the crisis. The purpose of this paper is to provide empirical evidence on if, and how, the features of bank board before the crisis affect the performance of banks during the crisis period or, in other words, to what extent the performance of banks during the 2007-2008 financial crisis can be attributable to characteristics of the board in the period (year) immediately prior to the crisis. The main question that motivates this study is "why did some banks perform worse/better during the crisis although the macroeconomic factors (e.g., loose monetary policy) related to the financial crisis generically impact on all firms?"[4] At the same time, the governance of banks, specially the boards of banks, has been criticised and often has been suggested that better governance would have led to better performance. Based on the above, it is timely to analyse whether differences in performance are the result of differences in internal governance mechanisms,[5] as is the case of the board. The paper identifies a set of board characteristics that affect the performance of banks such as board banking experience and busyness as well as various aspects of board diversity. The results are robust to the use of alternative definitions of

[4] For Taylor (2009), for example, a combination of macroeconomic factors such as loose monetary policies and complex securitisations is at the roots of the financial crisis.
[5] Although the main variables in this paper are board variables, it also includes a variable of ownership structure which is the institutional ownership variable.

the crisis period (i.e., July 2007 to December 2008 and January 2007 to September 2008) and to the endogeneity issue. The paper also examines the relationship between an index of the quality of governance, constructed on the basis of corporate governance codes and best practices recommendations concerning board characteristics, and stock return of banks. A positive and significant relationship was found.

The second paper "Determinants of European Banks' Bailouts Following the 2007-2008 Financial Crisis", presented in Chapter 3, provides empirical evidence on the determinants of bank bailouts in Europe, following the 2007-2008 financial earthquake. Given the massive and costly interventions by governments to support troubled banks, the main issue is to know what is behind bank bailouts, which justify the pertinence of analysing the determinants of the likelihood of bailouts in the banking sector. Furthermore, although the existing literature covers in detail the likelihood of financial distress and bankruptcy the same is not verified regarding bailouts. This paper aims to fill this gap. Overall, the findings show that a set of bank board characteristics, bank risks as well as bank-level and country-specific banking sector factors explain the likelihood of bank bailouts. The main results are robust to several checks and additional tests and have relevant policy implications mainly for public authorities as regulators.

Finally, the third paper "What Explains European Banks' Risk-Taking in the Context of the 2007-2008 Financial Crisis? A Simultaneous Equations Approach", presented in Chapter 4, examines the influence of a set of factors, in line with the existing literature, theoretical arguments and recommendations regarding banking risk governance, on risk-taking by banks. The financial crisis emphasised the importance of strong risk management and overseeing, especially at board-level, to assure protection and stability of banks. For Mongiardino and Plath (2010, p. 116) "*the failure of the directorial boards of such [financial] institutions to oversee risks properly is widely viewed as contributing to the crisis*." Given the significance of studying bank risk-taking, this paper aims to answer the question of which factors explain the risk taken by banks in the financial crisis, using a simultaneous equations approach. Also, the analysis is replicated for the period immediately before the crisis to investigate whether the influence of such factors depends on environmental conditions.

Table 1.1 compares the three papers systematising their purpose, focus, data sources, main research contributions, policy implications and method of estimation.

Table 1.1 – Comparison between the three papers

	Paper 1 **"Supervisory Boards, Financial Crisis and Banks' Performance: Do the Characteristics of the Board Matter?"**	Paper 2 **"Determinants of European Banks' Bailouts Following the 2007-2008 Financial Crisis"**	Paper 3 **"What Explains European Banks' Risk-Taking in the Context of the 2007-2008 Financial Crisis? A Simultaneous Equations Approach"**
Purpose	Analyse the impact of a wide range of board characteristics, in multiple dimensions such as experience, education, diversity and activity, on the returns of European banks, in the crisis period.	Investigate the determinants of the likelihood of bailouts of European banks following the financial crisis. Answer the question "What is behind the bailouts of European banks?"	Examine the main factors that are likely to influence risk-taking by European banks. Answer the question: "Which factors affect the risk taken by European banks?"
Focus	European banks' performance, measured by stock returns, in the financial crisis.	European banks' bailouts, following the financial crisis.	European banks' risk-taking, in the financial crisis.
Data Sources	BoardEx, Datastream, Thomson Financial, Annual Reports, European Corporate Governance Institute website, Djankov et al. (2007), Kaufmann et al. (2009) and Spamann (2010).	European Comission, Google and Bank's official websites, BoardEx, Datastream, Thomson Financial, Annual Reports, World Bank and Heritage Foundation websites.	BoardEx, Datastream, Thomson Financial and Annual Reports.
Main Research Contributions	Identification of the features of boards before the crisis that really impact on bank performance during the crisis in Europe; differences at board-level explain differences in performance.	Identification of the factors that make banks more prone to being bailed out by their governments, helping to predict bank bailouts and permitting the development of the necessary steps to avoid them.	Identification of the factors that have predictive power in explaining risk-taking by banks, aiding the prevention of excessive risk and promoting the safety and soundness of the financial system.
Policy Implications	At bank-level (bank management and shareholders) and at country-level (e.g., regulators, regarding the development and improvement of corporate governance codes and best practices recommendations).	Mainly at country-level (e.g., regulators and governments, concerned with avoiding costly bailouts that impact on the whole economy, helping them in the process of introducting new recommendations and legal rules, so as to prevent/mitigate future collapses and, thus, promote stability.	At bank-level (e.g., bank management and shareholders) and at country-level (e.g., regulators, bank risk is a major concern for bank regulators as the banking sector is crucial to the stability of the financial system).
Method of Estimation	Weighted Least Squares.	Probit model.	Simultaneous equations approach: Three-Stage Least Squares and Two-Stage Least Squares.

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CHAPTER 2

SUPERVISORY BOARDS, FINANCIAL CRISIS AND BANKS' PERFORMANCE: DO THE CHARACTERISTICS OF THE BOARD MATTER?

2 SUPERVISORY BOARDS, FINANCIAL CRISIS AND BANKS' PERFORMANCE: DO THE CHARACTERISTICS OF THE BOARD MATTER?

Abstract

The 2007-2008 financial crisis is considered to be the worst since the Great Depression and failures in governance, especially concerning boards, have been blamed for this financial turmoil. Increased public scrutiny on the role of the board of directors of banks, following the crisis, motivates us to examine whether and, to what extent, the characteristics of the board of banks influence their performance in the context of the above mentioned financial crisis.

We find that banks with more independent and busy boards experienced worse stock returns during the financial crisis. On the contrary, the better-performing banks had supervisory directors with more experience in the banking sector. Additionally, we find that gender and age diversity improve banks' performance during the crisis. So, in fact, diversity matters.

Also, we construct an index of the quality of governance based on the corporate governance codes and best practices recommendations as regards the characteristics of the board and we conclude that governance quality affects positively bank performance during the crisis period. Overall, our results suggest that the performance of banks during the financial crisis is a function of the quality of their governance and particularly the characteristics of their boards.

Keywords: Corporate Governance, Performance, Banks, Financial Crisis.
JEL classification: G01; G21; G34.

2.1 Introduction

During the financial crisis the quality of governance attracted more public attention especially concerning the quality of the board of banks. While nearly all banks suffered during the crisis period, some banks were affected much more than others despite being exposed to similar macroeconomic factors. So, can the features of the board explain the variation of bank returns during the crisis?

On the one hand, banks have specific governance issues (Becht et al., 2011) whereas on the other hand, the board of a bank plays a critical role in achieving effective governance[6] (Pathan and Faff, 2013). In the distinct context that involves the bank´s activities, the board is a key element in its governance structure (Caprio and Levine, 2002; Adams and Mehran, 2003; Macey and O'Hara, 2003). Caprio and Levine (2002), for example, highlight the fact that the role of the board is fundamental because neither the small equity and debt holders nor the market for corporate control (for example takeovers) and market competition can enforce an effective governance at banks. Also, the board as a governance mechanism is even more important in banks than it is in non-banks because the scope of fiduciary duties of directors extends beyond shareholders to depositors, other creditors and regulators (Macey and O'Hara, 2003; Mülbert, 2009). But, it has undoubtedly never been as vital to understand the governance of banks and their boards as it is now in the aftermath of the financial crisis. The resignations of several top executives (e.g., Charles Prince at Citigroup and Stan O'Neal at Merrill Lynch) and the recommendations by several proxy advisors against the re-election of the board of some banks (e.g., Citigroup) show that the boards are, at least partly, being blamed for their poor performance. The OECD Steering Group on Corporate Governance, for instance, defends that board failures in financial firms are one of the main causes of the financial crisis, evidencing that boards failed to set up appropriate risk strategies and establish suitable metrics to monitor their implementation in a timely and effective manner (Kirkpatrick, 2009). For Francis et al. (2012, p. 40) "*although weak corporate boards may not be the direct trigger of the current crisis, corporate board practices could affect the extent to which firms are vulnerable to the*

[6] However, for Adams (2012) understanding what constitutes an effective governance structure for a financial firm is complicated. Boards of financial firms may face more pressure to satisfy non-shareholder stakeholders interests than boards of non-financial firms as is the case of regulators and depositors.

financial crisis." To address fundamental deficiencies in bank corporate governance that became apparent during the financial crisis,[7] the Basel Committee on Banking Supervision has issued a final set of principles for enhancing sound corporate governance practices at banking organisations in a document titled "Principles for Enhancing Corporate Governance" in which the board is identified as a vital part of banks' regulatory reforms (BCBS, 2010).

In this paper, we explore whether, and to what extent, the features of the board of banks affect their performance in the financial crisis.

First, the corporate governance of banks attracted pronounced interest during the financial market turmoil which emerged in 2007 and banks clearly appear to have distinct governance structures than non-financial firms (Adams and Mehran, 2012).

Second, boards are one of the most important, probably even the most important, corporate governance mechanisms that: monitor and evaluate management – supervisory role, make managerial decisions such as which projects to undertake and which employees to hire – managerial role and offer valuable advice – advisory role. All these are especially important in certain types of firms[8] (e.g., Fama and Jensen, 1983; Williamson, 1983; Weisbach, 1988; John and Senbet, 1998; Adams and Mehran, 2003; Raheja, 2005; Adams and Ferreira, 2007; Andres and Vallelado, 2008; Coles et al., 2008; Adams et al., 2010; Schwartz-Ziv and Weisbach, 2013).

Third, the existing literature on the relationship between corporate boards and performance shows mixed results. One reason commonly cited for the inconclusive results is that a significant number of these studies fail to account for the endogeneity issue that emerges from the joint determination of board structure and the value of the firm (Hermalin and Weisback, 2003). "*Endogeneity leads to biased and inconsistent parameter estimates that make reliable inference virtually impossible*" (Roberts and Whited, 2012, p. 6). Thus, the findings of the studies that examine the board structure-performance relationship must be analysed with caution if the empirical methods do not appropriately control for all relevant sources of endogeneity (Wintoki et al., 2012). In our research this issue is less likely to be problematic because the financial crisis is an

[7] Often, weak corporate governance in the banking industry has been considered as one of the causes of the global financial crisis (Saghi-Zedek and Tarazi, 2015).
[8] Complex firms such as those that operate in multiple segments, are large in size, or have high leverage are likely to have greater advising requirements (Coles et al., 2008).

exogenous macroeconomic shock (Baek et al., 2004; Erkens et al., 2012; Francis et al., 2012). So, by testing the impact of a set of board characteristics immediately before the crisis on the performance of banks during the crisis, we can largely eliminate/mitigate the endogeneity concern.

Finally, the uniqueness of bank governance suggests that the effects of boards on bank performance may be different to their effects on non-financial firms and, thus, worthy of special attention (Elyasiani and Zhang, 2015).

We draw several conclusions from our results. The better-performing banks during the crisis had, in 2006, less independent and less busy boards, more banking experience and more diversity (gender and age). Interestingly, banks with the highest returns in 2006 had the worst returns during the crisis. Also, banks' performance during the crisis is positively related to capital and market-to-book ratios and negatively related to institutional ownership before the crisis. Finally, banks with a corporate governance committee in 2006 perform better during the crisis period. This suggests that having a corporate governance committee gives banks greater ability to evaluate and adapt their governance. So, flexibility matters.

Additionally, we construct a governance index as proxy for the quality of governance, and we find that better governance, according to governance policies, improves the performance of banks during the crisis.

Although we focus on bank-level governance mechanisms, we also examine how country-level governance mechanism such as the quality of legal institutions, the extent of laws protecting shareholder rights and creditor rights protection influenced the performance of banks during the crisis. We find that shareholder rights protection is positively related to the performance of banks but the general quality of the legal system and creditor rights protection are not.

Our paper adds to the literature which investigates whether the cross-variation in the performance of banks during the 2007-2008 global financial crisis can be explained by corporate governance mechanisms. In particular, our paper contributes to the academic governance studies that attempt to understand the role of corporate boards in the crisis period as those of Adams (2012), Erkens et al. (2012) and Francis et al. (2012). We complement the existing literature by showing that bank-level differences in boards are crucial to determining changes in bank performance during the crisis. Also,

our study provides evidence consistent with the financial crisis being a unique event in which board members play a critical role. While the vast majority of the existing studies analyses United States (US) firms, our research focuses on European banks from several different countries.

Additionally, our research extends the literature by examining a broad set of bank's board characteristics namely, experience, education, diversity, busyness and activity. It is, to the best of our knowledge, the first that examines diversity in its multiple dimensions: gender diversity, nationality (or cultural) diversity and age (or generational) diversity.

The remainder of the paper proceeds as follows. Section 2.2 presents the literature review and the hypotheses development, Section 2.3 describes the data and methodology, Section 2.4 provides the empirical results, Section 2.5 presents additional analysis and robustness tests and Section 2.6 provides the conclusion.

2.2 Literature review and hypotheses development

In this section, we review prior literature on corporate performance in order to formulate our hypotheses. We present arguments that justify the expected relationship between the characteristics of the board of directors and the performance of banks.

2.2.1 Board independence and performance

The emphasis on board independence in both academic and practitioner work suggests that independent directors are better monitors of management as they have concerns about their personal reputation, which affects their ability to receive additional director appointments[9] (Fama and Jensen, 1983). However, the empirical findings are mixed on the relationship between independence and performance.

Some academic literature provides evidence that the contribution of independent directors to the performance of the firm is positive. Rosenstein and Wyatt (1990)

[9] Gilson (1990) supports the importance of diretor reputation by finding evidence that directors who resign from financially distressed firms subsequently serve on fewer boards of other companies.

examine shareholder wealth effects surrounding the appointment of an outside director and conclude that stock price reacts positively to the nomination. Also, Daily and Dalton (1994) report a positive correlation between the proportion of affiliated directors and the likelihood of future bankruptcy and O'Connell and Cramer (2010) find a positive and significant association between the performance of listed Irish firms and the percentage of non-executives on the board. More recently, Francis et al. (2012) find no significant relationship between traditional board independence and the performance of non-financial firms during the crisis. But when they redefine independent directors as outside directors who preceded the current Chief Executive Officer (CEO), called "strong independent" directors, they find a significant and positive relationship between this strong independence and the stock performance of the firm.

However, notwithstanding these findings, there is a relative scarcity of empirical evidence indicating a significant positive association between the performance of the firm and board independence. Indeed, several studies show that there is no significant relationship between board independence and performance in non-financial firms (Baysinger and Butler, 1985; Hermalin and Weisbach, 1991; Bhagat and Black, 1999, 2002) or in banks (Staikouras et al., 2007; Adams and Mehran, 2012). For example, Staikouras et al. (2007) find that the impact of board independence in banks, although positive in all models is, in most cases, insignificant. Also, Adams and Mehran (2012) using a sample of banking firm data show that board independence is not related to performance, as measured by a proxy for Tobin's Q. Likewise, in the context of the Asian Financial Crisis, no effect was observed between board independence and the performance of non-financial firms (Leung and Horwitz, 2010).

Differently, Weisbach (1988), Byrd and Hickman (1992), Brickley et al. (1994), Borokhovich et al. (1996), Cotter et al. (1997), Raheja (2005), Boone et al. (2007), Coles et al. (2008), Harris and Raviv (2008) and Duchin et al. (2010), find that more independent boards add value, but only in some circumstances such as ownership structure, adoption of poison pills, cost of information acquisition and firm-specific knowledge. The results support the notion that a one-size-fits-all approach to corporate governance is likely to result in sub-optimal board structures and hinder the strategies of firms in dealing with poor performance (Coles et al., 2008; Robinson et al., 2012). A stream of theoretical research shows that the effectiveness of outsiders depends on the

information environment. Theoretically, it has long been recognised that the effectiveness of outside directors is limited by their inferior information compared to corporate insiders. So, in a context of high information asymmetry the inclusion of more inside directors may be beneficial, as they have greater specific information about the firm's activities (Fama and Jensen, 1983). Also, for Adams and Ferreira (2007) a potential disadvantage of outside directors is that they may lack relevant firm-specific information.[10] The more accurate the information available to the board, the greater the risk facing the CEO that the board will interfere in his/her decision-making. As a result, the CEO will not communicate firm-specific information to a board that is too independent (Adams and Ferreira, 2007). In this regard, Duchin et al. (2010) report that outsiders significantly improve performance when their information cost is low and decrease performance when their information cost is high.

Additionally, Coles et al. (2008) show that firms for which the firm-specific knowledge of insiders is relatively important are likely to benefit from greater insider representation on the board. This is relevant for firms operating in more uncertain environments, namely those that have a greater need for specialised knowledge (Pathan and Faff, 2013), as is the case of banks. In fact, "*independent directors are less likely to have an in-depth knowledge of the internal workings of the banks on whose boards they sit*" and "*they are also less likely to have the financial expertise to understand the complexity of the securitization processes banks were engaging in or to assess the associated risks banks were taking on*" (Adams, 2012, p. 32). Consistent with this view, Erkens et al. (2012) find that financial firms with more independent directors experienced worse stock returns during the crisis period and Adams (2012) shows that banks receiving bailout money had boards that were more independent than in other banks. In the same line, Pathan and Faff (2013) note that independent directors decrease US bank performance.

Given the regulatory nature and complexity of the banking business, whose activity is developed in a high information asymmetry environment, the inclusion of more independent directors might not be reflected in an increased performance as they

[10] The problem associated with outside directors' lack of firm-specific knowledge may be exacerbated for banks because regulatory restrictions may act to limit the pool of directors from which they can choose (Adams and Mehran, 2012) and because the complex nature of their businesses (Adams, 2012).

may not always have the knowledge required. So, the above discussion leads us to the first hypothesis (H_1):

H_1: More independent directors have a negative impact on bank performance in the financial crisis.

2.2.2 Board size and performance

The negative relationship between board size and the performance of the firm is one of the most common finding in the research on non-financial firms (Hermalin and Weisback, 2003) due to the lack of cohesiveness of larger boards as well as their higher coordination and communication costs (Lipton and Lorsch, 1992; Jensen, 1993; Raheja, 2005). These costs highlight the difficulty in decision-making as board size increases. So, smaller boards should be more effective because decision-making costs are lower in smaller groups (Adams, 2012). When boards are larger it becomes more difficult for directors to express their opinions and points of view within the restricted time available during the board meetings (Lipton and Lorsch, 1992). A larger board size may also create a free-riding problem, making it more difficult for board members to convince each other to monitor (Raheja, 2005). On large boards, since the incentive of an individual director to acquire and understand information as well as to supervise managers is low, it is easier for the CEO to control[11] (Jensen, 1993). Thus, several studies show an inverse relation between board size and the performance of the firm (Yermack, 1996; Conyon and Peck, 1998; Eisenberg et al., 1998; Mak and Kusnadi, 2005; Guest, 2009; O'Connell and Cramer, 2010). Yermack (1996), for example, finds a negative relationship between the market valuation of non-financial firms, measured by Tobin's Q, and board size.

Although the literature on board size predominantly suggests that smaller boards perform better, the meta-analysis developed by Dalton et al. (1999), on the contrary, indicates a positive relationship between board size and the performance of the firm. However, Coles et al. (2008) defends that this relationship depends on the firm's

[11] Since agency problems (such as directors' free-riding) become more severe as a board becomes larger, and thus it is easier for the CEO to influence and control the board, CEO power in decision-making increases with board size (e.g., Jensen, 1993).

complexity. Complex firms (diversified, large or highly levered) are more likely to benefit from a larger board of directors. Moreover, Raheja (2005) argues that since optimal board size is a function of the directors' and the firm's characteristics, a large board may be optimal under certain circumstances.

For banks, the literature is less abundant and the results are mixed. In fact, the research reports a positive relationship (Adams and Mehran, 2012), a negative relationship (Staikouras et al., 2007; Wang et al., 2012; Pathan and Faff, 2013), an inverted U-shaped relationship (Andres and Vallelado, 2008; Grove et al., 2011) and no relationship between board size and performance (Minton et al., 2014).

Given the unique bank operating environment and complex organisational structure, a larger board facilitates manager supervision and compliance with regulatory requirements (regulation distinguishes the banking industry from other industries), provides more human capital to advise managers and increases the potential of establishing contacts with several customers and depositors. So, larger boards may be beneficial because they increase the pool of expertise and resources available to the organisation, leading to setting more appropriate strategies, particularly important in regulated and complex activities as is the case of the banking activity. Nevertheless, boards with too many members can lead to problems of coordination, control and flexibility in decision-making. Thus, the relationship can become negative when the board becomes too large, which may impair bank performance due to a lack of efficiency and increased agency conflicts. Improvement in performance reaches a limit as the board grows. Said differently, bank performance will increase as the number of supervisory directors increases to a point where the relationship reaches a maximum from which performance will decrease. Accordingly, we might expect a nonlinear relationship between board size and bank performance. Thus, the second hypothesis (H_2) can be stated as follows:

H_2: Board size has a concave, or inverted U-shaped, relationship with bank performance in the financial crisis.

2.2.3 CEO duality and performance

It has long been argued that when the CEO is also the Chairman[12] the motivation of the board to monitor and oversee management is compromised due to a lack of independence and conflicts of interests (Jensen, 1993), reducing the board's ability to ensure that management pursues the development of activities that create value.

The choice of leadership type received increased public attention in the last decade due to a series of corporate and accounting scandals and, more recently, to the global financial crisis. Supporters of the separation between the roles of CEO and Chairman argue that when the the CEO is also the Chairman the agency cost are higher as the ability to supervise the CEO is reduced – *Entrenchment Theory*[13] (Fama and Jensen, 1983; Lipton and Lorsch, 1992; Jensen, 1993). This reduction in board oversight facilitates the pursuance of the CEO's agenda (Mallette and Fowler, 1992), which may diverge from shareholders' goals and, so, negatively affect the performance of the firm. On the other hand, advocates of the combination of the two roles defend that the choice of board leadership is based on the firm's economic and business environments so, joining both functions in the same individual may be best suited to a firm's conditions – *Efficiency Theory* (Brickley et al., 1997; Dey et al., 2011). In this sense the features of an effective board will change as a function of environmental conditions.[14/15] Accordingly, each firm weighs the costs and benefits related to both leadership structures and choses the one that is best suited to its economic and business conditions. In this context, duality may offer a clear direction of a single leader and consequently a faster response to external events, facilitating effective action by the CEO and consequently leading to higher performance. Additionally, Brickley et al. (1997) refer that some costs related to the separation of the roles have been overlooked

[12] We refer to the combination of the roles of CEO and Chairman of the board as CEO duality. So, CEO duality exists when a firm's CEO also serves as Chairman of the board of directors.
[13] Berger et al. (1997, p. 1411) define entrenchment "*as the extent to which managers fail to experience discipline from the full range of corporate governance and control mechanisms, including monitoring by the board, the threat of dismissal or takeover, and stock- or compensation-based performance incentives*."
[14] This idea is supported by studies linking board composition with environmental conditions as is the case of Pfeffer (1972) and Boyd (1990).
[15] According to Brickley et al. (1997) both leadership structures have costs and benefits and it is not theoretically obvious which of them is the best. In fact, the "*optimal structure is likely to vary according to the economic circumstances facing the firm*" (Brickley et al., 1997, p. 218).

by their advocates. These costs incorporate: agency costs of controlling the behaviour of the Chairman, information costs and costs associated with inconsistent decision making of shared authority.

The literature presents different conclusions as to the impact of the leadership structure on the performance of a firm (e.g., Donaldson and Davis, 1991; Rechner and Dalton, 1991; Boyd, 1995, for a detailed survey of the literature).

For non-financial firms, in the context of the financial crisis, Francis et al. (2012) find a negative coefficient on the "duality" variable but it is not significant at the traditional levels. So, board duality does not have a significant impact on performance. Using a sample of US commercial banks, Grove et al. (2011) show that CEO duality is negatively associated with bank performance in 2006 and 2007 but not in 2008. Additionally, Wang et al. (2012) find that CEO duality has a negative impact on the performance of US bank holding companies (BHCs). The opacity of banks[16] (Caprio and Levine, 2002; Morgan, 2002; Mülbert, 2009), the very nature of the banking business and the regulation and valuation difficulties that also weaken the potential role of the market for corporate control (Becht et al., 2011) can further reduce CEO discipline, which makes it more important to separate the leadership roles at banks. So, the third hypothesis (H_3) is formulated as follows:

H_3: CEO duality has a negative impact on bank performance in the financial crisis.

2.2.4 Board experience and performance

The effectiveness of internal control mechanisms in any financial or non-financial institution relies, to a great extent, on the monitoring and advising abilities of its board of directors.

There is a recent and increasing consensus that the strict and effective performance of both the monitoring and advisory roles depends on the experience of directors (Hau and Thum, 2009; Fernandes and Fich, 2013; von Meyerinck et al., 2013).

[16] Not only are bank balance sheets clearly opaque (Macey and O'Hara, 2003), but also "*rapid developments in technology and increased financial sophistication have challenged the ability of traditional regulation and supervision to foster a safe and sound banking system*" (Furfine, 2001, p. 33).

For Hau and Thum (2009, p. 719), for example, "*effective monitoring of bank managers may involve industry-specific knowledge which depends on experience."*

Regarding the valuation effects of director industry experience in non-financial firms, (Masulis et al., 2012) show that the proportion of independent expert directors on a board is positively and significantly correlated with the performance of the firm. Their findings suggest that industry expertise is associated with fewer earnings restatements, more cash holdings, a higher CEO pay-performance sensitivity, higher CEO turnover-performance sensitivity, and more patents with more citations. Also, Faleye et al. (2013) find that board industry expertise is robustly associated with a significant increase in the value of the firm. Their results demonstrate that industry experts add value by facilitating investments in innovation. Furthermore, von Meyerinck et al. (2013) document that firms announcing the appointment of a new director with industry experience exhibit economically and statistically significantly higher announcement returns than firms announcing the appointment of a director without this experience. They also provide evidence that investors value more highly industry experience as an inside director compared to industry experience as an employee or an outside director. Güner et al. (2008) had previously contributed to the literature by focusing more specifically on financial expertise rather than on relevant industry expertise in general. Examining the role of financial experts on the board of non-financial firms, they find that those experts significantly affect the finance and investment policies of firms, although not necessarily in the best interest of shareholders. When commercial bankers join a board the external funding increases and the investment-cash flow sensitivity decreases. However, this increase in financing is restricted to firms with good credit but poor investment opportunities. So, increasing financial expertise may not be beneficial to shareholders if conflicts of interest (e.g., bank profits) are not considered. Similar findings are reported by Dittmann et al. (2010). They analyse the role of bankers on the boards of German non-financial firms and find that banks that are represented on the board of a firm promote their own business as lenders, as mergers and acquisitions advisors and also act as financial experts who help firms to obtain funding. However, there is little evidence that bankers monitor management and it seems that their presence on the board causes a decline in the valuation of non-financial firms.

In short, in the case of non-financial firms adding bankers to boards may be not advantageous to shareholders because their interests may be conflicting.

Following the wave of the accounting scandals in the US and in particular in the aftermath of the financial crisis, regulators and shareholder activists, among others, have stressed the need for more financial and banking experience among directors.[17] The implicit assumption is that this would lead to better board oversight and advice and hence, would better serve the interests of shareholders. However, it is often asserted that bank board members lack banking and financial experience (Kirkpatrick, 2009). This finding is consistent with Guerrera and Larsen (2008) who report that more than two-thirds of the directors at eight large US financial institutions did not have any significant recent experience in the banking business and more than half had no financial services industry experience at all.[18] Further, Fernandes and Fich (2013) refer that an analysis of Lehman Brothers and Merrill Lynch prior to their collapse shows that their boards of directors lacked sufficient financial expertise.

In Europe, it seems that banking experience is also often quite limited among board members. In the United Kingdom (UK), for example, Northern Rock, the first bank in 150 years to suffer a bank run and ended up being nationalised in 2008, had just two board members with banking experience (Kirkpatrick, 2009). Based on this discussion, some recent literature has been investigating the impact of directors' financial expertise on the performance of banks during the recent financial crisis (Hau and Thum, 2009; Fernandes and Fich, 2013). Hau and Thum (2009), examining the 29 largest German banks, conclude that financial expertise of the supervisory board correlates with crisis performance. Also, Fernandes and Fich (2013) show that US banks with more financially experienced board members did better during the crisis, exhibiting better stock return performance.

The studies above suggest that a widespread lack of financial expertise on the boards of a large number of banks appear to have played a significant role in the recent crisis. Thus, we can reasonably expect that directors' banking experience has influenced

[17] In the survey "2012, Board practices report: Providing insight into the shape of things to come", elaborated in 2012 by Deloitte and Society of Corporate Secretaries & Governance Professionals, 47% of directors indicate industry experience as the most desired skill for board success in the next two years.

[18] Guerrera and Larsen (2008) also discuss the fact that the Sarbanes-Oxley Act of 2002 (SOX) made more difficult for financial companies to hire financial experts as directors because of the problem of conflicts of interests.

the performance of European banks during the financial crisis. The fourth hypothesis (H_4) is then stated as follows:

H_4: Supervisory directors' experience in the banking sector has a positive impact on bank performance in the financial crisis.

2.2.5 Board education and performance

In addition to directors' banking experience, the qualifications of directors may influence bank performance, as educational level leads to better judgments on a particular investment strategy and thus, to better corporate decisions.

This is particularly important in the case of banking firms because the complexity of their activity often requires a great amount of specific knowledge. OECD Corporate Governance Principles, more specifically "*the annotation to Principle VI.E.3 (board members should be able to commit themselves effectively to their responsibilities) touches on board training and refers that "this might include that board members acquire appropriate skills upon appointment (...)"*" (Kirkpatrick, 2009, p. 23). Widespread belief that director qualifications and experience matter is also reflected in the amendments to the US Securities and Exchange Commission's disclosure rules introduced in December 2009 (SEC, 2009). The amendments are intended to improve disclosures regarding risk, corporate governance, the qualifications of the directors and compensation.

However, academic papers emphasise experience rather than qualifications. Exception is the study by Hau and Thum (2009), which analyses the impact of the educational background of supervisory board members on the performance of banks during the financial crisis, defining three levels of educational achievement. The results reveal that board's average educational achievement does not show a statistically significant correlation with bank losses. Nevertheless, we conjecture that qualifications matter for the managing ability of executive directors as well as for the monitoring and advising abilities of supervisory directors. Unfortunately, when studying the biographies of board members we were unable to obtain sufficient data on the level of the qualifications of the directors. So we use as proxy education of the board the

average number of qualifications of the directors. Therefore, the fifth hypothesis (H_5) is formulated as follows:

H_5: Supervisory directors' education, measured as the number of qualifications, has a positive impact on bank performance in the financial crisis.

2.2.6 Board diversity and performance

The limitations related to some traditional, and more extensively studied, board characteristics in explaining the performance of firms have spurred finance researchers to investigate whether other board features, such as diversity, can improve board effectiveness.

The link between board diversity and shareholder value is relatively new, although there is literature since the 1990s that support expectations for improved performance and increased value for firms that implement diversity initiatives, thereby promoting action for managing diversity (Cox and Blake, 1991; Robinson and Dechant, 1997).

Firms which encourage diversity can create competitive advantages in several dimensions of business performance: cost, attraction of human resources, marketing success, creativity and innovation, problem-solving quality and organisational flexibility (Cox and Blake, 1991). Also, wider diversity in board member characteristics has been advocated as a means of improving organisational performance by providing boards with new insights and perspectives (Siliciano, 1996). For Fields and Keys (2003, p. 13) "*a key factor in diversity's successful impact on firm performance is the value found in the heterogeneity of ideas, experiences, and innovations that diverse individuals bring to the firm*."

While Cox and Blake (1991) and Robinson and Dechant (1997), focus on workplace diversity in general, the issues are similar for board diversity (Carter et al., 2003). The rationale behind the view of diversity as a positive force within boards builds on the assumption that the existence of multiple and divergent viewpoints within a board will decrease the likelihood that the agenda and initiatives will be dominated by the CEO and his/her inside director allies, thus improving the monitoring role of the

board (Kim et al., 2013). Also, fielding a team of top executives with varied cultural backgrounds and life experiences can broaden a firm's strategic perspective (Barta et al., 2012).

Diversity can take any number of forms, including personal demographics such as gender, race, ethnicity and nationality (Milliken and Martins, 1996; Erhardt et al., 2003).

Although board diversity has several dimensions the literature reveals a predominance of gender diversity (Carter et al., 2003; Bernardi et al., 2005; Farrell and Hersch, 2005; Adams and Ferreira, 2009; Kang et al., 2010; Adams and Funk, 2012; Julizaerma and Sori, 2012; Pathan and Faff, 2013), with ethnic diversity (Carter et al., 2003; Bernardi et al., 2005; Julizaerma and Sori, 2012) and political ideology (Kim et al., 2013) being much less frequent. Following the increased attention that gender diversity has received, boards around the world are under increasing pressure to choose female directors. In fact, many proposals for governance reform explicitly emphasise the importance of gender diversity on the board. The most prominent promotion of gender diversity took place in Norway, where since January 2008 all listed companies must abide by a 40% gender quota for female directors or face dissolution (Adams and Ferreira, 2009; Adams and Funk, 2012). Most of the national legislative initiatives are based on the view that the presence of women on boards creates value. Female board directors bring knowledge of female market segmentation (Daily et al., 1999) and provide unique perspectives, experiences, and work styles as opposed to their male counterparts (Daily and Dalton, 2003), which can greatly enhance deliberations of the board. Also, female directors are more likely to bring international diversity to the board and hold an MBA degree (Singh et al., 2008). These attributes will lead to better performance when combined with female characteristics such as communication and listening skills (Julizaerma and Sori, 2012). This allows them to perform better on group problem solving and in the decision-making process (Robinson and Dechant, 1997; Daily and Dalton, 2003). Likewise, Bart and McQueen (2013) document that female directors can make significant contributions to the board due to their higher quality decision-making capability, which helps better explain the higher rates of return, more effective risk management and even lower rates of bankruptcy when women are present on the board. In addition, previous literature documents that female directors are

in general better prepared than men for board meetings (Huse and Solberg, 2006) and have better attendance records (Adams and Ferreira, 2009). Moreover, Gul et al. (2011) find that gender diversity improves stock price informativeness.

Although the positive benefits of female directorships have empirical support, [19] other studies fail to find a significant relationship between female directorships and the performance of the firm (Shrader et al., 1997; Farrell and Hersch, 2005; Rose, 2007). Shrader et al. (1997) find negative but insignificant association between the proportion of female directors and several accounting performance measures for large US firms. In the same way, Farrell and Hersch (2005) report that women tend to serve on the board of better performing firms, although they document insignificant abnormal returns on the announcement of a woman added to the board. Also, Rose (2007) finds no significant link between the performance of a firm, as measured by Tobin's Q, and female board representation in Danish firms. On the contrary, Adams and Ferreira (2009) show that female directors are more effective than men in monitoring, however the average effect of gender diversity on the performance of firms is negative. These mixed results may be due to different types of industries (Harrigan, 1981) and female directors' ability and willingness to make alliances with the most influential board members and take leadership roles, among others factors (Huse and Solberg, 2006) and also could be a reflection of "*methodological differences, such as how gender diversity and firm performance are measured, or to differences in national cultural attitudes toward women that affect the generalization of results across countries*" (Kang et al., 2010, p. 889).

In the context of the financial crisis, Francis et al. (2012) show evidence that female board representation does not affect the performance of the non-financial firms. On the contrary, García-Meca et al. (2015) find that gender diversity improves bank performance, confirming the positive role of female directors on the performance of banks. Nevertheless, regarding banks, or even financial firms, there is a clear lack of empirical studies that examine the link between performance and gender diversity, although in the light of the financial crisis this issue has been raised and discussed

[19] For instance, Carter et al. (2003) find a significant positive association between the percentage of female directors and the performance of firms as measured by Tobin's Q in a sample of Fortune 1000 firms. More recently, Barta et al. (2012) evidence that between 2008 and 2010, companies with more diverse top teams were also top financial performers.

publicly, especially in the media. Kristof (2009) noticed the lack of women in banks around the world and implicitly suggested that male domination may have contributed to their recent poor performance. Similarly, Harriet Harman, at the time, the UK Deputy Leader of the Labour Party, laid the blame for the financial meltdown on male domination of the top jobs at banks and, citing, argued that the financial crisis would have been less extreme if Lehman Brothers had been Lehman Sisters (Morris, 2009). In addition, the European Union commissioner, Michel Barnier suggested that having more women on the boards of banks would help prevent the kind of "group-think" that exacerbated the crisis[20/21] (Treanor, 2011). In their research, Pathan and Faff (2013) find that, although gender diversity improves US bank performance in the pre-SOX period, the positive effect of gender diminishes in both the post-SOX and the crisis periods. In formulating our expectation related to gender diversity and the performance of European banks during the financial crisis we rely on the public belief of gender diversity value. So, the sixth hypothesis and the first related to board diversity ($H_{6.1}$) is stated as follows:

$H_{6.1}$: The proportion of female supervisory directors' on board has a positive impact on bank performance in the financial crisis.

National culture has an important impact on executive mindsets, as demonstrated by the fact that executives of different cultural background are not equally open to change in organisational strategy and leadership profiles (Geletkanycz, 1997) and in the interpretation and response to strategic issues (Schneider and De Meyer, 1991).

Group members drawn from various nationalities tend to differ in ways that have substantial implications for group functioning, since national culture has a significant effect on the outlook, perceptions, and behaviour of individuals (Hambrick et al., 1998).

Masulis et al. (2012) argue that firms with foreign independent directors (FID) exhibit significantly poorer performance, especially as their business presence in the FID's home region becomes less important. Also, FID display poor board meeting

[20] According to him more diversity on boards of banks and other financial institutions, in particular more women, is not just one of better gender equality, but also one of better corporate governance.

[21] In November 2012, European Commission has proposed legislation that forces publicly listed companies in all, at the time, 27 member states, with the exception of small and medium enterprises, to reserve at least 40% of their non-executive director board seats for women by 2020. However, this legislation aims to accelerate progress towards a better gender balance on the corporate boards and not, at least explicitly, corporate governance.

attendance records and are associated with a greater likelihood of intentional financial misreporting, higher CEO compensation, and a lower sensitivity of CEO turnover to performance. In addition, according to García-Meca et al. (2015) nationality diversity, measured as the percentage of foreign directors, has a negative impact on bank performance. However, the percentage of foreign directors on the board may not be the best measure to represent nationality diversity, given that a high percentage can be obtained by merely having a large number of foreign directors of a single country.

On the one hand, foreign directors are likely to be less familiar with national accounting rules, laws and regulations, governance standards and management methods, thereby making it more difficult for them to evaluate managerial performance or challenge managerial decisions. The territorial scope of bank activities may offset some of the advantages of nationality diversity. When banks have a predominantly national emphasis, local knowledge of operations becomes crucial. On the other hand, foreign directors can provide valuable international expertise and advice to firms to the extent that they bring a wide range of knowledge and experiences from different institutional environments. So, "*nationality diversity will lead to superior firm performance through (1) access to – and more thorough processing of – relevant information and (2) diverse institutionally embedded experiences leading to higher quality decisions via better filtering and interpretation*" (Nielsen and Nielsen, 2013, p. 375). While nationality has received very little attention, Nielsen and Nielsen (2013) find that this dimension of diversity in top management teams is positively related to performance. Foreign directors may enhance the advisory capability of boards, despite the potential monitoring problems associated with them. Nationally diverse boards provide broad and complementary knowledge as well as experiences in different institutional contexts, which improve the quality of decisions. Despite these conflicting arguments, we rely on the idea that, in general, the benefits related to nationality diversity outweigh their costs. Therefore, the sixth hypothesis and the second related to board diversity ($H_{6.2}$) is stated as follows:

$H_{6.2}$: Greater nationality diversity of supervisory directors on the board, measured as the proportion of supervisory directors from different countries, has a positive impact on bank performance in the financial crisis.

An individual's age is expected to influence strategic decision-making perspectives and choices (Wiersema and Bantel, 1992). However, there are mixed views on how the average age of a director impacts agency conflicts and, subsequently, the performance of the firm (Grove et al., 2011).

On the one hand, older directors have more knowledge and experience, which might facilitate effective monitoring and attenuate agency costs. On the other hand, flexibility decreases and rigidity and resistance to change increase as people age (Wiersema and Bantel, 1992) and older directors might, also, lack the incentive and energy to actively monitor managers, thereby increasing agency problems (Grove et al., 2011). For Child (1974) younger men are able to expend more physical and mental effort on promoting the change and growth of their firms. In this viewpoint, young board members will be more vigorous and provide greater continuity into the future than will older board members (Cochran et al., 1984). Likewise, lower managerial age is associated with both risk-taking and strategic change (Child, 1974; Wiersema and Bantel, 1992) which seems to suggest that boards of higher average age may be more likely to control young managers inclined to take risks at the expense of shareholders. However, for Vroom and Pahl (1971) younger persons place more value on risk taking than older persons. Bantel and Jackson (1989) argue that there are several reasons why we can expect young managers to bring better cognitive resources to decision-making tasks. For example: (1) some cognitive abilities seem to diminish with age, including learning ability and (2) younger managers are likely to have received their education more recently than older managers, so their technical knowledge should be superior. In this sense, young aged boards are more likely to have the skills and cognitive resources needed to evaluate risk effectively as well as the willingness to take the risks that result in higher returns for shareholders. Although lower age of managers is associated with receptivity to change, heterogeneity on age is neither significantly related to changes in corporate strategy (Wiersema and Bantel, 1992) nor facilitates innovativeness (Bantel and Jackson, 1989). No study that directly examines the effect of age diversity on performance was found, however, we believe that the relationship between age diversity and bank performance can be positive as it brings to the board different points of view and perspectives and, consequently, might lead to better decisions and performance.

Therefore, the sixth hypothesis and the third related to board diversity ($H_{6.3}$) is formulated as follows:

$H_{6.3}$: Greater age diversity of supervisory directors on the board has a positive impact on bank performance in the financial crisis.

2.2.7 Board busyness and performance

The literature disagrees on the link between the number of directorships held by directors and the performance of firms. In fact, the evidence on the association between busyness of directors and the value of the firm is mixed.

The first strand of literature argues that busy directors should positively affect the performance of the firm. Fama and Jensen (1983) suggest that multiple directorship signal director's abilities/quality. Similarly, Gilson (1990), Kaplan and Reishus (1990), Ferris et al. (2003) and Fich and Shivdasani (2007), amongst others, provide additional evidence that multiple directorships certify director quality. In this view, the number of directorships held by a director might proxy for reputational capital, with such individuals viewed as high quality directors, and higher quality directors are more frequently asked to serve on additional boards, *Reputational Hypothesis*. Confirming a reputation effect, Bugeja et al. (2009) find that directors with multiple directorships have a lower rate of turnover and a greater increase on future board seats. Poor performance is punished and greater performance is rewarded in the market for directors. This pattern is documented, for example, in financially distressed firms (Gilson, 1990), in firms that cut dividends (Kaplan and Reishus, 1990), in firms that fire a poorly performing CEO (Farrell and Whidbee, 2000) and in firms that are target of a takeover bid (Harford, 2003). For Perry and Peyer (2005) when fewer agency concerns exist, additional directorships relate to increased value of the firm, possibly through learning or networking opportunities or through the signalling of managerial quality. Additionally, Harris and Shimizu (2004) find that busy directors are important sources of knowledge and enhance acquisition performance. Moreover, Field et al. (2013) postulate that, due to the relatively high demand for advising over monitoring services, busy directors may be especially beneficial to young firms. Busy directors tend to be

better connected and more experienced than their non-busy counterparts which will be of evident value to firms with relatively few connections and little experience. Carpenter and Westphal (2001), in turn, show that the monitoring and advising behaviour of directors, and consequently shareholder value, depend on the strategic perspective and base of expertise provided by their appointments to other boards. More recently, Elyasiani and Zhang (2015) show that the performance of BHCs, using accounting measures, is positively related to busyness of directors, based on the idea that busy directors provide better advice due to their valuable knowledge and connections.

The second strand of literature defends that busy outside directors may be less effective monitors. The *Busyness Hypothesis* postulates that serving on too many directorships reduces directors' time and attention, and consequently their ability to monitor management, decreasing the value of the firm. Directors with multiple directorships are too busy to monitor and advise management (Benson et al., 2015). While the number of directorships, according to some studies, appears to be closely linked to reputational capital of directors, other studies suggest that holding too many directorships may lower the effectiveness of outside directors as corporate monitors and decrease firm value (e.g., Loderer and Peyer, 2002; Fich and Shivdasani, 2006; Jackling and Johl, 2009; Cashman et al., 2012; Méndez et al., 2015). Accordingly, Loderer and Peyer (2002) document that seat accumulation is negatively related to the value of the firm, possibly because of the conflicts of interest that directors are exposed to when they serve on several boards simultaneously and the insufficient time they can dedicate to any one of multiple mandates. The exception to this rule is a Chairman of the board with multiple seats in listed firms. Fich and Shivdasani (2006) also find that firms with busy directors, those where a majority of outside directors hold three or more directorships, exhibit lower market-to-book ratios, weaker profitability and lower sensitivity of CEO turnover to the performance of the firm. Likewise, Jackling and Johl (2009) find evidence of a negative effect of busy outside directors on a firm's performance, suggesting that "busyness" did not add value in terms of networks and improvement of resource accessibility and Ahn et al. (2010) show that acquiring firms where directors hold more outside board seats experience more negative abnormal returns. Nonetheless, this adverse effect does not extend across the entire range of

multiple directorships. Rather, the damanging impact is significant only when the number of outside board seats surpasses a certain threshold. On the contrary, Grove et al. (2011) show that a concave association between busy directors and performance is not supported by any of the regression models. Cashman et al. (2012) find evidence that: (1) the distinct results in prior work derive from differences in both sample composition and empirical design and (2) on balance the results suggest a negative relationship between board busyness and the performance of the firm. Directors who take on too many directorships are spread too thinly, impairing their ability to attend meetings. More recently, Méndez et al. (2015) find that busy directors are detrimental to the monitoring capability of the board and its committees. Additionally, Jiraporn et al. (2009) report a higher tendency of busy directors to be absent from board meetings.

Regarding the financial crisis period, Francis et al. (2012) find that the number of directorships has no impact on the performance of non-financial firms. However, Muller-Kahle and Lewellyn (2011) report a positive relationship between outside director busyness and subprime lending, from 1997-2005, supporting the view that serving on multiple boards compromises a director's ability to effectively perform monitoring duties. Although busy directors are expected to bring more skills and connections as defended by Elyasiani and Zhang (2015), the opaque and complex nature of the banking business requires more time and attention from a director in order to effectively fulfil the monitoring and advising roles (Liang et al., 2013). Considering the specificities associated with the banking activity and times of crisis we expect that the costs of having busy directors outweigh the benefits related to the additional connections/network of contacts that such directors may bring. So, the seventh hypothesis (H_7) is stated as follows:

H_7: Busier supervisory directors on the board, measured as the average number of directorships, have a negative impact on bank performance in the financial crisis.

2.2.8 Board activity and performance

In the agency framework, the intensity of board activity, measured by the frequency of board meetings, may indicate an active monitoring role of corporate

boards and so influence corporate performance. Following this view, board meetings are beneficial to shareholders. Conger et al. (1998) suggest that board meeting time is an important mechanism in improving the effectiveness of boards. The higher the frequency of meetings, the greater the supervision of top management, indicating a more effective monitoring role, which might mitigate agency costs and subsequently improve the performance of the firm (Grove et al., 2011). An opposing view is that board meetings are not necessarily useful because, given their limited time, they cannot be used for the meaningful exchange of ideas among directors or with management (Jensen, 1993). Moreover, routine tasks absorb much of the meetings, thereby limiting opportunities for outside directors to meaningfully exercise control over management (Vafeas, 1999). Vafeas (1999) finds that boards that meet more frequently are less valued by the market. This relation disappears when prior stock performance is included in the model, suggesting that the relation runs from poor performance to higher board activity and not vice-versa. According to him, the association between board meeting frequency the value of the firm is not *a priori* clear.

On the one hand, there are costs associated with board meetings, including managerial time, travel expenses and meeting fees of directors. On the other hand, there are benefits, including more time for directors to confer, define strategy and monitor management. Also, Andres and Vallelado (2008) find explanations both for and against a positive relation between the frequency of meetings and the performance of banks. Meetings provide board members with the opportunity to come together to discuss and exchange ideas on how they intend to monitor managers and bank strategy. Therefore, the more frequent the meetings, the closer the control over managers, the more significant the advisory role, factors that lead to a positive impact on performance (proactive boards). Furthermore, the complexity of the banking business and the importance of information require a more active and effective advisory role by boards. Additionally, boards of banks tend to be larger and have more committees, which are required to meet more frequently in order to be effective (Adams and Mehran, 2003). However, frequent meetings might also be a result of the board's reaction to poor performance (reactive boards) (Andres and Vallelado, 2008). Concerning US banks, Grove et al. (2011) find weak evidence that board meeting frequency is positively associated with financial performance. The more frequent the meetings, the increased

the supervision of top management, which might mitigate agency costs and subsequently improve bank performance. Consistent with this view, the eighth hypothesis (H_8) is, thus, formulated as follows:

H_8: Board meeting frequency is positively associated with bank performance in the financial crisis.

2.3 Data and methodology

In this section we first characterise the sample and describe the data sources used. Next, we discuss the variables and characterise the 2007-2008 financial crisis timeline. Finally, we present the empirical framework.

2.3.1 Sample and data sources

The sample examined in this study includes European listed banks from 17 different countries. The fact that it is restricted to banks included in BoardEx, the main data source concerning board information, limits its size to 72 banks. Furthermore, due to missing values relating to some variables of governance, the sample size used in this paper is slightly lower. For some banks, board data was also drawn from their annual reports. Financial data was obtained from Datastream and ownership data from Thomson Financial. In order to construct the governance index, data from corporate governance codes was gathered from the European Corporate Governance Institute code database, available at http://www.ecgi.org/codes/all_codes.php. Data related to best practices recommendations on the characteristics of boards was also collected (e.g., the available report of Deloitte (2013)). We supplemented this data with data from commercial codes.

2.3.2 Variables description

We now discuss our key variables of interest. As in Fahlenbrach and Stulz (2011), Aebi et al. (2012), Beltratti and Stulz (2012), Erkens et al. (2012), Fahlenbrach et al. (2012) and Francis et al. (2012), we collect data on various variables for the year 2006, the last complete year before the beginning of the financial crisis. Please see Appendix 2.1.

2.3.2.1 Performance variable

Similar to Fahlenbrach and Stulz (2011), Beltratti and Stulz (2012), Erkens et al. (2012) and Fahlenbrach et al. (2012), our measure of performance is buy-and-hold stock returns over the crisis period, *Bank performance* variable. We gather data on the stock returns of banks from Datastream.

2.3.2.2 Board characteristics variables

We focus our analysis on board independence and board size, which are the two board characteristics that have been more extensively studied in the US (Denis and McConnell, 2003), CEO duality, board experience, board education, board diversity, board busyness and board activity. The data was obtained from BoardEx and Datastream databases, as well as from annual reports, and refers to 2006 (i.e., prior to the onset of the crisis) like Fahlenbrach and Stulz (2011), Beltratti and Stulz (2012), Erkens et al. (2012), Francis et al. (2012) and Fernandes and Fich (2013). BoardEx provides detailed information on the composition of the board of publicly listed firms. Recent studies also rely on BoardEx as a source of governance and board data (e.g., Engelberg et al., 2012; Erkens et al., 2012; Fernandes and Fich, 2013; van Essen et al., 2013). We define *Board independence* as the percentage of independent directors. BoardEx does not classify directors as independent as part of its own analysis, instead when it classifies a director as an independent director it is because the firm which they

work for has disclosed them as such. In other words, BoardEx takes the firm's classification for granted and accordingly provides this information. But, this fact does not constitute a serious problem because the Codes of Best Practices of European countries, to the best of our knowledge, tend to converge on the definition of board independence. *Board size* is defined as the total number of directors on the board and *CEO duality* is a dummy variable equal to one if the CEO is also the Chairman and zero otherwise. *Board experience* is measured as the average years of experience in the banking sector of the supervisory directors. *Board education* is measured as the average number of qualifications held by supervisory directors. Although it was useful to use the average level of directors' qualifications, we are unable to use it because after examining each director's biography we obtain insufficient data on their qualifications level. Board diversity is measured in three different but complementary ways: gender diversity (*Women*), calculated as the percentage of female supervisory directors on the board; nationality diversity (*Nationality_mix*) computed as the proportion of supervisory directors from different countries and age diversity (*Age diversity*) computed as the standard deviation of the age of supervisory directors. *Board busyness* is measured as the average number of board positions (number of directorships) held by supervisory directors and, finally, *Board activity* is measured as the annual number of board meetings.

2.3.2.3 Control variables

Following previous studies such as Mitton (2002), Adams and Mehran (2012), Erkens et al. (2012), Francis et al. (2012) and Pathan and Faff (2013), some control variables are included to account for several factors that might affect stock performance of banks. The first one is the performance in 2006, measured as the buy-and-hold stock returns from January 2006 to December 2006, to control for prior bank performance (*2006 performance*). The second is the size of the bank, (*Bank size*) measured by the natural logarithm of market capitalisation. The third is the capital of the bank (*Capital*) measured by the ratio of total equity to total assets. The fourth is the market-to-book ratio (*MBR*) measured by the market value of equity to the book value of equity. Also,

to control for ownership structure we include the *Institutional ownership* variable, measured as the percentage of shares owned by institutional investors and, finally, to account for the existence of a corporate governance committee we include the *CG committee* variable, which is a dummy variable that equals one if the bank has a corporate governance committee and zero otherwise.

2.3.3 Timeline

We conduct our empirical analysis using two different and alternative definitions of the crisis period. First, like Fahlenbrach and Stulz (2011), Aebi et al. (2012), Beltratti and Stulz (2012), Fahlenbrach et al. (2012), Fernandes and Fich (2013) and van Essen et al. (2013) we define our crisis period from July 2007 to December 2008. According to Fahlenbrach and Stulz (2011) and Beltratti and Stulz (2012), admittedly, the crisis did not end in December 2008 and bank stocks lost substantial ground in the first quarter of 2009. However, during this period the banking sector suffered losses not witnessed since the Great Depression. Also, subsequent losses were, at least partly, affected by the uncertainty surrounding the possibility of bank nationalisations. Second, we investigate the robustness of our results using an alternative crisis period from January 2007 to September 2008 as Erkens et al. (2012). In this case, the crisis period is defined as starting at the beginning of 2007, because according to Ryan (2008) the first wave of the crisis started in early 2007,[22] and ended in the third quarter of 2008 for two main raisons: (1) at the end of the third quarter of 2008, regulators in various countries imposed short-selling prohibitions on the stocks of many financial institutions to contain sharp falls in their stock prices (Erkens et al., 2012) and (2) in October 2008 the International Accounting Standards Board issued amendments to grant companies the option of abandoning fair value recognition for selected financial assets. Such changes allow firms to reclassify financial assets from market value based valuation to historical cost based valuation (Erkens et al., 2012). Thus, some European banks use the reclassification option to forgo the recognition of fair value losses (Bischof et al., 2011).

[22] We note that, although in early 2007 the market first realized the severity of the subprime mortgages problems, the credit crunch did not really begin until July 2007 (Ryan, 2008).

In order to avoid the confounding effects of government intervention Erkens et al. (2012) choose as the end of the crisis period the third quarter of 2008.

2.3.4 Empirical framework

In this sub-section we present the estimation method and the empirical models used to analyse the relationship between bank performance and the characteristics of boards and the relationship between bank performance and the quality of the governance, using a governance index constructed in accordance with the corporate governance codes and best practices recommendations, regarding the characteristics of boards.

2.3.4.1 Bank performance and board characteristics

We examine the relationship between bank performance and board characteristics during the crisis, by regressing buy-and-hold-stock return during the crisis on our board characteristics and control variables using the Weighted Least Squares (WLS) method. The WLS method provides a method for dealing with heteroscedasticity (e.g. Gujarati and Porter, 2010; Greene, 2012; Wooldridge, 2012). In the presence of heteroscedasticity of known form we can use WLS, which is more efficient than Ordinary Least Squares (Wooldridge, 2012). The BLUE[23] estimators are provided by WLS (Gujarati and Porter, 2010). We expect that the source of heteroscedasticity is bank size. Using the Breusch-Pagan test for heteroscedasticity (Breusch and Pagan, 1979), the null hypothesis of homoscedasticity is rejected at conventional levels. Additionally, we test for model misspecification using the RESET test[24] and the null hypothesis of correctly specified model could not be rejected at conventional levels. So we conclude that the model is correctly specified.

[23] Best Linear Unbiased Estimator.
[24] Some tests have been proposed to detect general functional form misspecification. The regression specification error test (RESET) by Ramsey (1969) has proven to be useful in this regard (Wooldridge, 2012).

Our regression model is as follows:

$$
\begin{aligned}
(Bank\ performance)_{i,t} \;=\; & \beta_0 + \beta_1(Board\ independence)_{i,t-1} + \\
& + \beta_2(Board\ size)_{i,t-1} + \beta_3(Board\ size)^2_{i,t-1} + \\
& + \beta_4(CEO\ duality)_{i,t-1} + \beta_5(Board\ experience)_{i,t-1} + \\
& + \beta_6(Board\ education)_{i,t-1} + \beta_7(Women)_{i,t-1} + \\
& + \beta_8(Nationality\_mix)_{i,t-1} + \beta_9(Age\ diversity)_{i,t-1} + \\
& + \beta_{10}(Board\ busyness)_{i,t-1} + \beta_{11}(Board\ activity)_{i,t-1} + \\
& + \beta_{12}(2006\ performance)_{i,t-1} + \beta_{13}(Bank\ size)_{i,t-1} + \\
& + \beta_{14}(Capital)_{i,t-1} + \beta_{15}(MBR)_{i,t-1} + \\
& + \beta_{16}(Institutional\ ownership)_{i,t-1} + \\
& + \beta_{17}(CG\ committee)_{i,t-1} + \\
& + \sum_{j=1}^{n} \beta_{(17+j)}(DCountry)_{ji,t-1} + \varepsilon_{i,t} \qquad (2.1)
\end{aligned}
$$

where, i is the index of the i^{th} bank, t is the crisis time period, $t-1$ is the pre-crisis time period (2006), n is the number of country dummies and $\varepsilon_{i,t}$ is the error term. $Bank\ performance$ is the stacked vector of the dependent variable, the i^{th} bank buy-and-hold stock returns from July 2007 to December 2008, MBR is the market-to-book ratio and $DCountry$ are the country dummies indicating the country of the bank.

For a detailed definition of the variables please see sub-section 2.3.2 and Appendix 2.1.

2.3.4.2 Bank performance and compliance with corporate governance codes and best practices recommendations regarding board characteristics

We examine whether bank performance in the financial crisis can be attributed to the fact that these institutions were non-compliant with corporate governance codes and best practices recommendations concerning the board characteristics previously analysed. The arguments presented in Section 2.2 to predict how these characteristics relate to bank performance are based on those that the literature reports more frequently.

However, academics do not all agree on these predictions and sometimes the literature also "defies" some governance principles, as is the case of board independence.

We use regulation or regulatory recommendations concerning each particular characteristic regardless of the literature predictions. Corporate Governance Codes of all countries in our sample promote, even before the crisis, board independence. On the other hand, most of them do not make recommendations concerning board size, typically only referring to something like "*the board should be small enough for efficient decision-making. It should be large enough for its members to contribute experience and knowledge from different fields and for changes to the board's composition to be managed without undue disruption"* (Belgian Corporate Governance Code, 2004, p.12) or "*the board should not be so large as to be unwieldy. The board should be of sufficient size that the balance of skills and experience is appropriate for the requirements of the business and that changes to the board's composition can be managed without undue disruption"* (The Combined Code on Corporate Governance, 2006, p. 5). The exceptions are Spain and Finland whose codes refer, respectively, that "*in the interests of maximum effectiveness and participation, the Board of Directors should ideally comprise no fewer than five and no more than fifteen members*" (Unified Good Governance Code, 2006, p. 14) and "*to ensure the effective implementation of the duties of the board, it should comprise at least five directors. In some circumstances, however, it may be justified to elect less than five directors. In a relatively small company, a board consisting of three directors may be able to adequately discharge the duties pertaining to the board"* (Corporate Governance Recommendations for Listed Companies, 2003, p. 7).

Following the crisis, the general recommendation is also that the board should have a size that enables it to perform its duties in an efficient manner. The UK´s Walker Review (2009) states that board size will depend on particular circumstances and so, there can be no general prescription as to optimum board size. However, the behavioural studies of the optimal group size prepared for this Review report that the optimum size for a board is within the range of 8 to 12 persons. The separation of the role of CEO and Chairman is a general recommendation and the division of responsibilities between them should be clearly established. Also, the codes emphasise

that board members must have relevant experience, knowledge, qualifications and competence. The need for boards to have industry experience in banks and other financial institutions is greater than in the non-financial business (Walker, 2009). Although the improvement of diversity, especially gender diversity, is addressed by some codes even before the crisis, following the recent financial turmoil this issue gained significantly more relevance. [25] Numerous countries are implementing boardroom gender quotas (Deloitte, 2013). For example, since January 2008, Norway has enforced a gender quota requirement for corporate board membership at all public limited liability companies. They are obliged, by law,[26] to ensure that at least 40% of their board directors are women. Concerning board busyness, in France, Germany and Denmark, for example, there are limits on the number of directorships directors can hold.[27] Finally, regarding board activity, the board should meet with the necessary frequency so as to allow an in-depth review and discussion of the matters and so, effectively perform its functions.

Table 2.1 summarises regulatory policy/recommendations (increase or decrease) for each board characteristic in order to improve governance quality. Using the predictions we construct a governance index. For each characteristic (except for board size and for CEO duality) we define a dummy variable which, is equal to one if the bank has better than the mean quality governance for that characteristic and zero otherwise. For board size we assign a value of one if it ranges between 8 and 12 members and zero otherwise. For CEO duality we assign a value of one if the CEO is not the Chairman and zero otherwise. Governance index is the sum of all dummy variables. A higher value means better quality of governance.

[25] "*The board's composition should ensure that decisions are made in the corporate interest. It should be determined on the basis of gender diversity and diversity in general, as well as complementary skills, experience and knowledge"* (The 2009 Belgian Corporate Governance Code, 2009, p. 13).
[26] Public Limited Liability Companies Act § 6-11a.
[27] For example, article 100(2) of the German Stock Corporations Act prohibits supervisory board members from serving on more than ten supervisory boards of any incorporated companies that are legally required to have a supervisory board, although up to five additional directorships are allowable for group companies.

Table 2.1 – Regulatory policy/recommendations concerning board characteristics

Board characteristic	Regulatory policy/recommendations	According to regulatory policy/recommendations, board characteristic must…	Governance index
Board independence	Corporate Governance Codes and Principles	Increase	1 if above sample mean, 0 otherwise
Board size	UK's Walker Review (2009), according to the specific analysis of the Tavistock Institute of Human Relations (TIRH)[28]	Increase within the range of 8 – 12 persons (the optimum size); otherwise decrease (the overall effectiveness of the board, outside a quite narrow range, tends to vary inversely with its size)	1 if between 8 and 12, 0 otherwise
CEO duality	Corporate Governance Codes and Principles	Decrease	1 if the CEO is not the Chairman, 0 otherwise
Board experience	Corporate Governance Codes and Principles; UK's Walker Review (2009)	Increase	1 if above sample mean, 0 otherwise
Board education	Corporate Governance Codes and Principles	Increase	1 if above sample mean, 0 otherwise
Board diversity	Corporate Governance Codes and Principles; Norwegian Public Limited Liability Companies Act; Deloitte (2013)	Increase	1 if above sample mean, 0 otherwise
Board busyness	France's New Economic Regulations Law (May 15, 2001) (http://uk.practicallaw.com/5-107-0184?q=&qp=&qo=&qe); German Stock Corporations Act, Article 100(2); Danish Corporate Governance Code, amongst others	Decrease	1 if below sample mean, 0 otherwise
Board activity	Corporate Governance Codes and Principles	Increase	1 if above sample mean, 0 otherwise

[28] In Annex 4 of the Walker report, the TIHR makes the link between understanding the behaviour of board chairs, group dynamics and improving board performance effectiveness.

Our regression model is as follows:

$$
\begin{aligned}
(Bank\ performance)_{i,t} \;=\; & \beta_0 + \beta_1(Governance\ index)_{i,t-1} + \\
& + \beta_2(2006\ performance)_{i,t-1} + \beta_3(Bank\ size)_{i,t-1} + \\
& + \beta_4(Capital)_{i,t-1} + \beta_5(MBR)_{i,t-1} + \\
& + \beta_6(Institutional\ ownership)_{i,t-1} + \\
& + \beta_7(CG\ committee)_{i,t-1} + \\
& + \sum_{j=1}^{n} \beta_{(7+j)}(DCountry)_{ji,t-1} + \varepsilon_{i,t} \qquad (2.2)
\end{aligned}
$$

where, i is the index of the i^{th} bank, t is the crisis time period, $t-1$ is the pre-crisis time period (2006), n is the number of country dummies and $\varepsilon_{i,t}$ is the error term. $Bank\ performance$ is the stacked vector of the dependent variable, the i^{th} bank buy-and-hold stock returns from July 2007 to December 2008, $Governance\ index$ is the index of the quality of governance, MBR is the market-to-book ratio and $DCountry$ are the country dummies indicating the country of the bank.

For a detailed definition of the variables please see sub-section 2.3.2 and Appendix 2.1.

2.4 Empirical results

In this section we first report and analyse the descriptive statistics and the Pearson correlation matrix. Second, we present and discuss the core results.

2.4.1 Descriptive statistics and correlation matrix

Table 2.2 provides the descriptive statistics for the variables used in our analysis. Panel A presents descriptive statistics of bank performance (during the crisis). Panel B presents descriptive statistics of the characteristics of boards (before the crisis) and Panel C presents descriptive statistics of control variables (before the crisis).

Table 2.2 – Descriptive statistics

The table reports the descriptive statistics of each variable by showing mean, median, standard deviation (Std. dev.), maximum (Max.) and minimum (Min.).

Variable	# Obs.	Mean	Median	Std. dev.	Max.	Min.
Panel A: Bank performance variable						
Bank performance (%)	72	-64.50	-66.70	21.41	27.99	-98.87
Panel B: Board characteristics variables						
Board independence (%)	72	41.45	44.10	28.73	95.45	0.00
Board size (Nº)	72	16.39	15.00	5.70	31.00	6.00
CEO duality	72	0.07	0.00	0.26	1.00	0.00
Board experience (years)	72	12.75	10.78	6.51	35.06	3.00
Board education (Nº)	72	1.49	1.45	0.71	3.00	0.10
Women (%)	72	10.87	9.10	10.77	42.90	0.00
Nationality_mix	70	0.21	0.15	0.24	0.80	0.00
Age diversity (years)	72	7.48	7.21	2.85	16.60	1.20
Board busyness (Nº)	72	2.63	2.38	1.01	5.75	1.10
Board activity (Nº)	58	10.81	10.00	6.26	36.00	4.00
Panel C: Control variables						
2006 performance (%)	72	25.07	20.84	19.61	93.98	-29.25
Bank size (€ bil.)	72	22.73	11.41	29.59	160.44	0.22
Capital (%)	72	5.48	5.24	2.71	14.67	1.79
MBR (%)	72	238.59	209.70	108.61	692.48	47.08
Institutional ownership (%)	69	44.46	44.32	27.00	100.00	0.03
CG committee	68	0.18	0.00	0.38	1.00	0.00

Note: Observations vary because of missing data.

Please refer to Appendix 2.1 for the definition of each variable.

Panel A reports large negative average returns during the crisis period, substantially more pronounced than in other studies as is the case of Beltratti and Stulz (2012), Fahlenbrach et al. (2012) and Fernandes and Fich (2013), whereas the minimum stock return is -98.87% and the maximum is 27.99%.

The descriptive statistics of board characteristics in Panel B shows that, on average, 41.45% of the directors on the board are independent, a much lower percentage when compared to other studies (e.g., Fernandes and Fich, 2013; Pathan and Faff, 2013). The board has on average 16.39 directors, although there is a wide distribution of board size in the sample (a minimum of 6 directors and a maximum of 31 directors).

The average number of directors on the board of banks, in our sample, is higher than the average number of directors on the board of non-financials firms (e.g., 12.25 in Yermack (1996), 10.4 in Coles et al. (2008) and 9.14 in Francis et al. (2012)), confirming that, as evidenced by Adams and Mehran (2003) and Adams (2012), banks have on average larger boards. Only 7% of the CEOs in our sample also serve as Chairman of the board. In relation to board experience and board education we find, respectively, that on average supervisory directors have 12.75 years of bank experience and hold 1.49 qualifications. The descriptive statistics of board diversity show that: (1) the percentage of female supervisory directors is, on average, 10.87%, with a minimum of 0% (no women as supervisory directors) and a maximum of 42.90%, (2) nationality-mix is, on average, 0.21, exhibiting a minimum of 0, which means that there is no foreign supervisory directors on board, and a maximum of 0.80 and (3) age diversity is, on average, 7.48 years, with a minimum of 1.20 years and a maximum of 16.60 years. With regard to board busyness, supervisory directors held on average 2.63 directorships, ranging from 1.10 to 5.75 board positions. The annual number of board meetings is, on average, 10.81, ranging from 4 to 36 meetings per year.

Finally, Panel C shows that the stock returns in 2006 are, on average, 25.07%, with a minimum of -29.25% and a maximum of 93.98%. Bank size is, on average €22.73 billion, with a minimum of €0.22 billion and a maximum of €160.44 billion. The quite positively skewed distribution of the *Bank size* variable motivates the use of the natural logarithm, *ln(Bank Size),* in the regression analysis. The capital ratio is, on average, 5.48% and the ratio of the market value of equity to the book value of equity is, on average, 238.59%, exhibiting high variability. Institutional investors own, on average, 44.46% of bank shares and 18% of our sample banks have a corporate governance committee.

Table 2.3 presents the Pearson correlation matrix for all the variables.

Table 2.3 – Pearson correlation matrix

	Variables	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17
1	Bank performance	1.00																
2	Board independence	0.15	1.00															
3	Board size	-0.15	**-0.35**	1.00														
4	CEO duality	0.13	-0.06	-0.08	1.00													
5	Board experience	0.13	**-0.25**	**0.24**	-0.02	1.00												
6	Board education	**-0.25**	**0.31**	**-0.24**	-0.14	-0.11	1.00											
7	Women	0.01	0.07	-0.09	-0.14	**-0.43**	0.07	1.00										
8	Nationality_mix	**-0.41**	**0.25**	-0.09	-0.09	0.09	**0.53**	-0.12	1.00									
9	Age diversity	0.26	-0.11	**0.26**	0.05	**0.41**	-0.21	-0.16	-0.15	1.00								
10	Board busyness	**-0.27**	**-0.24**	**0.43**	0.04	**0.39**	0.14	**-0.24**	**0.32**	0.12	1.00							
11	Board activity	0.16	**0.30**	-0.19	-0.04	0.08	-0.06	0.15	**-0.26**	0.10	-0.18	1.00						
12	2006 performance	0.07	-0.20	-0.04	-0.10	**0.24**	**-0.23**	-0.19	-0.20	-0.06	0.03	0.11	1.00					
13	Bank size	**-0.34**	**0.29**	**0.27**	0.08	0.02	**0.40**	-0.02	**0.42**	-0.07	0.19	-0.11	**-0.26**	1.00				
14	Capital	**0.38**	-0.07	**-0.29**	0.05	0.10	-0.05	**-0.31**	-0.20	0.09	-0.10	0.07	0.02	**-0.40**	1.00			
15	MBR	0.08	0.18	**-0.47**	0.02	-0.11	0.12	-0.04	0.00	-0.21	-0.21	-0.12	**0.42**	**-0.35**	0.21	1.00		
16	Institutional ownership	0.01	**-0.27**	0.20	**-0.28**	0.17	-0.14	0.12	-0.07	-0.02	0.09	-0.16	0.17	-0.07	-0.17	-0.17	1.00	
17	CG committee	-0.19	0.14	-0.01	-0.12	0.10	0.20	-0.18	**0.26**	-0.01	0.08	0.05	0.09	0.10	-0.18	0.09	-0.14	1.00

Bold text indicates significance at the 1%, 5% and 10% levels, using a two-tailed test. Please refer to Appendix 2.1 for the definition of each variable.

Correlation coefficients indicate that the higher correlation is 0.53,[29] among the variables *Nationality_mix* and *Board education*, which is considered a moderate correlation. Thus, multicollinearity should not be a serious issue in this regression.

2.4.2 Core results

Table 2.4 presents the results of the WLS estimations. Columns (1) to (10) report the regression result on each of the characteristics of the board and the control variables. Column (11) reports the results of our full regression model.

[29] This is well below the threshold of 0.8 beyond which multicollinearity is considered a problem (e.g., Berry and Feldman, 1985; Retherford and Choe, 1993; Gujarati, 2004). Regarding multicollinearity "*in practice the pairwise correlations usually tell most of the story*" (Retherford and Choe, 1993, p. 40).

Table 2.4 – Relationship between bank performance and board characteristics

The table reports the WLS regression results of stock returns of banks during the crisis on board characteristics.

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)
Board	-3.17***	---	---	---	---	---	---	---	---	---	-1.76*
independence	(0.000)										(0.052)
Board size	---	55.11**	---	---	---	---	---	---	---	---	-35.40
		(0.022)									(0.478)
Board size^2	---	-1.04	---	---	---	---	---	---	---	---	1.11
		(0.104)									(0.379)
CEO duality	---	---	-63.17**	---	---	---	---	---	---	---	44.83
			(0.017)								(0.112)
Board	---	---	---	20.67***	---	---	---	---	---	---	13.84***
experience				(0.000)							(0.006)
Board	---	---	---	---	-5.15	---	---	---	---	---	17.77
education					(0.832)						(0.374)
Women	---	---	---	---	---	-12.08***	---	---	---	---	8.23**
						(0.001)					(0.015)
Nationality_	---	---	---	---	---	---	237.27***	---	---	---	67.64
mix							(0.001)				(0.274)
Age diversity	---	---	---	---	---	---	---	32.76***	---	---	14.41*
								(0.000)			(0.079)
Board	---	---	---	---	---	---	---	---	-78.53*	---	-39.54*
busyness									(0.085)		(0.093)

Table 2.4 – Relationship between bank performance and board characteristics *(cont.)*

The table reports the WLS regression results of stock returns of banks during the crisis on board characteristics.

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)
Board activity	---	---	---	---	---	---	---	---	---	-22.15***	-2.55
										(0.011)	(0.603)
2006 performance	-5.73***	-0.53	-3.04	-5.11***	-1.92	-7.78***	-3.78*	-5.17***	-1.76	-3.13	-2.95*
	(0.001)	(0.723)	(0.198)	(0.007)	(0.479)	(0.007)	(0.100)	(0.005)	(0.465)	(0.232)	(0.095)
Bank size	-18.08	32.21	16.86	152.81***	61.94	47.39	73.76	-66.70*	-1.30	1.55	7.80
	(0.572)	(0.284)	(0.738)	(0.000)	(0.241)	(0.290)	(0.111)	(0.095)	(0.983)	(0.978)	(0.780)
Capital	22.86**	27.58***	32.20**	21.99**	29.72*	38.37***	64.83***	31.17***	22.50	39.09**	16.69*
	(0.017)	(0.004)	(0.029)	(0.047)	(0.058)	(0.007)	(0.000)	(0.005)	(0.145)	(0.021)	(0.056)
MBR	0.58**	1.09***	0.94***	1.40***	0.75**	1.13***	1.54***	0.57**	0.37	0.86**	0.65***
	(0.011)	(0.000)	(0.009)	(0.000)	(0.045)	(0.002)	(0.000)	(0.026)	(0.371)	(0.028)	(0.010)
Institutional ownership	-4.36***	-2.79***	-2.09*	1.12	-2.00	-3.01***	0.62	-1.46*	-3.92**	-0.61	-1.12*
	(0.000)	(0.001)	(0.060)	(0.238)	(0.103)	(0.007)	(0.624)	(0.072)	(0.018)	(0.640)	(0.063)
CG committee	90.49***	62.23***	60.87***	74.25***	79.35***	106.43***	116.07***	159.31***	43.09	79.75***	87.52**
	(0.000)	(0.000)	(0.004)	(0.000)	(0.001)	(0.000)	(0.000)	(0.000)	(0.128)	(0.001)	(0.011)
Country dummies	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
N	66	66	66	66	66	66	64	66	66	55	54
Adj-R^2	0.95	0.95	0.88	0.93	0.86	0.89	0.89	0.94	0.87	0.88	0.99

The p-values of coefficient significance are in brackets and asterisks indicate significance at the 1% (***), 5% (**) and 10% (*) levels, using a two-tailed test. Please refer to Appendix 2.1 for the definition of each variable.

Table 2.4 shows that the estimated coefficient on the *Board independence* variable is negative and statistically significant, confirming hypothesis H_1 that board independence decreases bank performance during the financial crisis. The negative impact for independence is consistent with previous studies (e.g., Erkens et al., 2012; Pathan and Faff, 2013). As found in the US context, likewise in a pan-European context, board independence negatively influences the performance of banks.

With regard to the *Board size* variable, both the coefficients on the linear and non-linear factors are insignificant at conventional levels and so, contrary to Andres and Vallelado (2008) and Grove et al. (2011), we do not find a concave association between the size of the board and bank performance. Thus, hypothesis H_2 is not confirmed.

Concerning the *CEO duality* variable, Column (3) reports, as predicted, a negative and statistically significant coefficient but the joint regression of all variables shows that the coefficient is positive but not statistically significant. Thus CEO duality has no impact on bank performance, which does not confirm hypothesis H_3.

Regarding the banking experience of supervisory directors, as expected, banks with more experienced boards perform better during the financial crisis, which confirms hypothesis H_4. The estimated coefficient on the *Board experience* variable is not only statistically significant but also economically significant. Banking experience of supervisory directors, which is associated with a deep understanding of regulatory issues and banking activity specificities and complexity, has a positive and economically important effect on the performance of banks during the crisis. This finding confirms the recent frequently heard claim for having more financial/banking experts on the boards. A better understanding of banking activity helps supervisory directors to oversee management. Furthermore, supervisory directors with banking experience provide valuable advice to management.

In relation to the education of supervisory directors, the coefficient on the *Board education* variable is not statistically significant. So, we do not find support for hypothesis H_5 that supervisory directors with a higher number of qualifications improve the performance of banks.

With regard to gender diversity, the estimated coefficient on the *Women* variable is positive and statistically significant. Thus, we find support for hypothesis $H_{6.1}$ that female supervisory directors improve the performance of banks during the financial

crisis, which is in accordance with Kristof (2009), Morris (2009) and Treanor (2011) that the lack of women on boards of banks contributed to their poor performance. Thus, an increased percentage of women as supervisory directors increased the performance of banks.

With regard to nationality diversity, the estimated coefficient on the *Nationality_mix* variable is positive but not statistically significant at conventional levels. Thus, concerning hypothesis $H_{6.2}$ we do not find evidence that board nationality diversity increases the performance of banks. So, the predominantly national activity focus of many banks in our sample makes local knowledge fundamental, offsetting the advantages relating to nationality diversity.

Further, regarding diversity, the estimated coefficient on the *Age diversity* variable is positive and statistically significant which is consistent with hypothesis $H_{6.3}$. Thus, age diversity of supervisory directors improves bank performance during the financial crisis.

Concerning the busy supervisory directors, hypothesis H_7, the negative and statistically significant coefficient on the *Board busyness* variable indicates, as expected, that supervisory directors holding multiple directorships decrease the performance of banks. Thus, our finding provides support for the *Busyness Hypothesis*.

Contrary to our expectation, the coefficient on the *Board activity* variable is negative, but statistically insignificant. Therefore, the number of meetings exhibits no significant impact on bank performance and so, hypothesis H_8 is not confirmed.

The estimated coefficients on the control variables offer some further interesting insights. As in Beltratti and Stulz (2012) banks that perform better in 2006 have worse returns during the crisis or, in other words, the better-performing banks in the crisis had lower returns immediately before the crisis. This finding is consistent with the idea that banks that suffered the most in the crisis seemed to have policies that the market favoured before the crisis and/or that these were engaging in riskier activities. On the contrary, the size of the bank has no impact on its performance.

When a financial crisis occurs, we would expect banks with more capital to perform better. We find that this is the case. The statistically significant positive coefficient on the *Capital* variable indicates that highly capitalised banks perform better during the crisis as in previous studies (e.g., Pathan and Faff, 2013). Most conservative

banks in their capital structure report higher stock returns. Therefore, the better-performing banks had less leverage before the crisis. An explanation for this finding is that a bank with more capital has a cushion to absorb adverse shocks. Also, the banks most valued by the market relative to their book value exhibited better performance. The market valuation of the banks and, therefore, the market's growth expectations are positively associated with performance during the crisis. Our result is consistent with Fahlenbrach and Stulz (2011), which report a negative relation between the book-to-market ratio and the crisis returns. Consistent with Erkens et al. (2012) our analysis finds that institutional ownership is associated with worse stock returns during the crisis. Finally, the statistically significant positive coefficient on the *CG committee* variable demonstrates that banks with a corporate governance committee perform better during the crisis. A potential explanation for this finding is that such banks are able to better periodically review and reassess the adequacy of their governance to environmental circumstances and, more timely, recommend any changes. So, these banks are adept at introducing changes in their governance, having greater flexibility and responsiveness. Finally, we note that we find similar results when we use the natural logarithm of assets as a proxy for bank size.

Table 2.5 presents the results when we use an aggregate governance index instead of individual board characteristics.

Table 2.5 – Relationship between bank performance and governance index

The table reports the WLS regression results of stock returns of banks during the crisis on governance index, which measures governance quality.

	(1)
Governance index	36.56***
	(0.000)
2006 performance	-4.09*
	(0.070)
Bank size	-13.50
	(0.773)
Capital	42.10***
	(0.004)
MBR	0.96***
	(0.005)
Institutional ownership	-0.71
	(0.496)
CG committee	99.99***
	(0.000)
Country dummies	Yes
N	54
Adj-R^2	0.91

The p-values of coefficient significance are in brackets and asterisks indicate significance at the 1% (***), 5% (**) and 10% (*) levels, using a two-tailed test. Please refer to Appendix 2.1 for the definition of each variable.

Table 2.5 shows that governance quality according to corporate governance codes and best practices recommendations, measured by the governance index, impacts positively and very significantly on bank performance during the crisis.

2.5 Additional analysis and robustness tests

In this section we present additional analysis, by considering the impact country-level governance on the performance of banks and we also perform robustness tests.

2.5.1 Bank performance and country-level governance

Primarily we focus on the role of corporate boards features on bank performance. Additionally, the international corporate governance literature suggests that another important dimension of corporate governance is the external governance mechanism in a country (Denis and McConnell, 2003), mainly the legal institutions that protect shareholder rights, both in terms of the quality of a country's legal institutions and its laws protecting shareholder rights, and creditor rights (La Porta et al., 1998). Since our primary analysis includes country dummies to control for country-specific factors, it does not address how country-level governance influenced the performance of banks during the crisis. So, we explore the influence of country-level governance on bank performance. As proxy for the quality of legal institutions we use the governance indicators compiled by Kaufmann et al. (2009) for six dimensions of governance: (1) voice and accountability, (2) political stability and absence of violence, (3) government effectiveness, (4) regulatory quality, (5) rule of law and (6) control of corruption and, following Beltratti and Stulz (2012) and Erkens et al. (2012), we consider the simple average of the six governance indicators for each country. We call this index *Institutions* and a higher value of the index indicates a better institutional environment. We measure the laws protecting shareholder rights using the updated antidirector rights index (*ADRI*) compiled by Spamann (2010).[30] A higher value means better shareholder rights. Finally, to assess the impact of creditor rights protection in each country, we use the Djankov et al. (2007) creditor rights index, which we call *Creditor rights*, which follows that constructed by La Porta et al. (1998) with minor differences. The index varies between 0 (poor creditor rights) and 4 (strong creditor rights).

[30] Like Erkens et al. (2012) we use the legal institutions variable of Kaufmann et al. (2009) and the antidirector index of Spamann (2010) because we want to utilise an index measured closest to the beginning of the financial crisis.

Our regression model is as follows:

$$
\begin{aligned}
(Bank\ performance)_{i,t} = {} & \beta_0 + \beta_1(Institutions)_{i,t-1} + \beta_2(ADRI)_{i,t-1} + \\
& + \beta_3(Creditor\ rights)_{i,t-1} + \\
& + \beta_4(2006\ performance)_{i,t-1} + \beta_5(Bank\ size)_{i,t-1} + \\
& + \beta_6(Capital)_{i,t-1} + \beta_7(MBR)_{i,t-1} + \\
& + \beta_8(Institutional\ ownership)_{i,t-1} + \\
& + \beta_9(CG\ committee)_{i,t-1} + \varepsilon_{i,t} \qquad (2.3)
\end{aligned}
$$

where, i is the index of the i^{th} bank, t is the crisis time period, $t-1$ is the pre-crisis time period (2006 except if another year is indicated) and $\varepsilon_{i,t}$ is the error term. $Bank\ performance$ is the stacked vector of the dependent variable, the i^{th} bank buy-and-hold stock returns from July 2007 to December 2008. $Institutions$ is the simple average of six governance indicators: (1) voice and accountability, (2) political stability and absence of violence, (3) government effectiveness, (4) regulatory quality, (5) rule of law and (6) control of corruption, based on the 2006 index value in Kaufmann et al. (2009), $ADRI$ is the corrected antidirector index of La Porta et al. (1998), based on the 2005 index value in Spamann (2010) and $Creditor\ rights$ is the creditor rights index of Djankov et al. (2007), following that constructed by La Porta et al. (1998). MBR is the market-to-book ratio.

For a detailed definition of the variables please see sub-section 2.3.2 and Appendix 2.1.

Table 2.6 reports the analysis on country-level governance variables. Panel A shows the values of the country-level governance variables. Panel B provides descriptive statistics for these variables. Panel C presents the results from the regression analysis.

Table 2.6 – Analysis on country-level governance variables

Panel A: Country-level governance variables

Country	Institutions	Antidirector rights	Creditor rights
Austria	1.58	4	3
Belgium	1.35	2	2
Cyprus	0.97	---	---
Denmark	1.82	4	3
Finland	1.92	4	1
France	1.21	5	0
Germany	1.52	4	3
Greece	0.66	3	1
Ireland	1.55	4	1
Italy	0.57	4	2
Netherlands	1.62	4	2
Norway	1.70	4	2
Portugal	1.02	4	1
Spain	0.92	6	3
Sweden	1.71	4	2
Switzerland	1.78	3	1
UK	1.55	5	4

Panel B: Descriptive statistics of country-governance variables

	# Obs.	Mean	Median	Std. dev.	Max.	Min.
Institutions	72	1.26	1.43	0.44	1.92	0.57
ADRI	70	4.14	4	0.95	6	2
Creditor rights	70	1.90	2	1.02	4	0

Note: Observations vary because of missing data.

Panel C: Regression of stock returns during the crisis on country-governance variables

	(1)	(2)	(3)	(4)
Institutions	-55.75***	---	---	-29.17
	(0.008)			(0.194)
ADRI	---	27.12***	---	23.85***
		(0.002)		(0.010)
Creditor rights	---	---	-7.72	-6.85
			(0.215)	(0.259)
2006 performance	-3.61***	-5.66***	-2.91***	-5.55***
	(0.000)	(0.000)	(0.000)	(0.000)
Bank size	23.11	-32.92	9.42	-7.97
	(0.300)	(0.151)	(0.686)	(0.755)
Capital	12.83**	1.05	25.40***	5.22
	(0.035)	(0.894)	(0.001)	(0.554)
MBR	0.20	-0.04	0.20	0.17
	(0.180)	(0.770)	(0.232)	(0.267)
Institutional ownership	-3.16***	-4.03***	-2.92***	-3.31***
	(0.000)	(0.000)	(0.000)	(0.000)
CG committee	69.88***	48.84***	67.22***	53.17***
	(0.000)	(0.002)	(0.000)	(0.001)
Country dummies	No	No	No	No
N	66	64	64	64
Adj-R^2	0.84	0.85	0.82	0.85

The p-values of coefficient significance are in brackets and asterisks indicate significance at the 1% (***), 5% (**) and 10% (*) levels, using a two-tailed test. Please refer to Appendix 2.1 for the definition of each variable.

Columns (1) to (3) report the results on each of the country-level governance variables and the control variables.

Column (4) presents our full model. Panel C shows that the coefficient on the *Institutions* variable is statistically insignificant, meaning that the quality of legal institutions does not affect the performance of banks during the financial crisis, as found by Erkens et al. (2012) in a dataset of financial firms. On the contrary, the coefficient on the *ADRI* variable is positive and statistically significant. So, laws protecting shareholders rights improve bank performance during the financial crisis. Differently, Erkens et al. (2012) and van Essen et al. (2013) do not find that antidirector rights have

beneficial impact, respectively, on the performance of financial firms and non-financial firms during the recent crisis. Finally, creditor rights protection has no impact on banks performance, unlike non-financial firms (van Essen et al., 2013).

2.5.2 Using an alternative definition of the crisis period

We investigate the robustness of our results using an alternative crisis period from January 2007 to September 2008 as Erkens et al. (2012). So, we re-run our model regression. Table 2.7 and Table 2.8 report the results of this analysis.

Table 2.7 – Relationship between bank performance and board characteristics using an alternative definition of the crisis period

The table reports the WLS regression results of stock returns of banks during the crisis – January 2007 to September 2008 – on board characteristics.

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)
Board	-1.32***	---	---	---	---	---	---	---	---	---	-1.40**
independence	(0.000)										(0.021)
Board size	---	29.89**	---	---	---	---	---	---	---	---	-22.97
		(0.039)									(0.481)
Board size^2	---	-0.64*	---	---	---	---	---	---	---	---	0.64
		(0.100)									(0.438)
CEO duality	---	---	-23.44*	---	---	---	---	---	---	---	60.97***
			(0.065)								(0.002)
Board	---	---	---	9.70***	---	---	---	---	---	---	7.17**
experience				(0.000)							(0.025)
Board	---	---	---	---	10.91	---	---	---	---	---	28.74**
education					(0.341)						(0.036)
Women	---	---	---	---	---	-4.99***	---	---	---	---	4.82**
						(0.004)					(0.028)
Nationality_	---	---	---	---	---	---	110.59***	---	---	---	30.02
mix							(0.001)				(0.455)
Age diversity	---	---	---	---	---	---	---	15.19***	---	---	9.30*
								(0.000)			(0.083)
Board	---	---	---	---	---	---	---	---	-21.05	---	-19.95
busyness									(0.337)		(0.189)

Table 2.7 – Relationship between bank performance and board characteristics using an alternative definition of the crisis period *(cont.)*

The table reports the WLS regression results of stock returns of banks during the crisis – January 2007 to September 2008 – on board characteristics.

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)
Board	---	---	---	---	---	---	---	---	---	-7.42*	0.40
activity										(0.081)	(0.900)
2006	-1.46*	-0.53	-0.30	-1.36	-0.46	-2.30*	-0.73	-1.37	0.13	-0.31	-1.13
performance	(0.100)	(0.566)	(0.791)	(0.120)	(0.720)	(0.086)	(0.497)	(0.113)	(0.910)	(0.809)	(0.238)
Bank size	6.57	28.86	22.91	82.57***	32.71	33.74	45.41**	-19.74	22.40	19.14	16.53
	(0.716)	(0.117)	(0.354)	(0.000)	(0.189)	(0.129)	(0.042)	(0.305)	(0.444)	(0.502)	(0.369)
Capital	25.09***	27.62***	28.84***	24.32***	27.20***	31.50***	44.31***	28.61***	25.95***	31.03***	16.09***
	(0.000)	(0.000)	(0.000)	(0.000)	(0.001)	(0.000)	(0.000)	(0.000)	(0.001)	(0.001)	(0.007)
MBR	0.27**	0.50***	0.41**	0.65	0.36**	0.50***	0.71***	0.26**	0.24	0.38*	0.09
	(0.032)	(0.001)	(0.018)	(0.000)***	(0.041)	(0.004)	(0.001)	(0.037)	(0.230)	(0.051)	(0.562)
Institutional	-2.14***	-1.32***	-1.19**	0.30	-0.98*	-1.57***	0.06	-0.91**	-1.66**	-0.69	-0.64*
ownership	(0.000)	(0.007)	(0.030)	(0.503)	(0.088)	(0.004)	(0.921)	(0.023)	(0.037)	(0.294)	(0.100)
CG	72.49***	62.28***	60.93***	65.57***	63.25***	79.05***	85.08***	105.03***	57.88***	67.90***	82.26***
committee	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.001)
Country	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
dummies											
N	66	66	66	66	66	66	64	66	66	55	54
Adj-R^2	0.97	0.97	0.94	0.97	0.94	0.95	0.95	0.97	0.94	0.94	0.99

The p-values of coefficient significance are in brackets and asterisks indicate significance at the 1% (***), 5% (**) and 10% (*) levels, using a two-tailed test. Please refer to Appendix 2.1 for the definition of each variable.

Regarding Table 2.7, we find that board independence, board experience, female supervisory directors (gender diversity), age diversity, bank capital, institutional ownership and the existence of a corporate governance committee maintain their impact on bank performance.[31] So, our main conclusions on the relation between bank performance during the crisis and board characteristics are qualitatively similar to those reported in Table 2.4.

Table 2.8 – Relationship between bank performance and governance index using an alternative definition of the crisis period

The table reports the WLS regression results of stock returns of banks during the crisis – January 2007 to September 2008 – on governance index, which measures governance quality.

	(1)
Governance index	18.72***
	(0.000)
2006 performance	-0.98
	(0.318)
Bank size	1.28
	(0.950)
Capital	34.29***
	(0.000)
MBR	0.45***
	(0.003)
Institutional ownership	-0.51
	(0.275)
CG committee	78.64***
	(0.000)
Country dummies	Yes
N	54
Adj-R^2	0.97

The p-values of coefficient significance are in brackets and asterisks indicate significance at the 1% (***), 5% (**) and 10% (*) levels, using a two-tailed test. Please refer to Appendix 2.1 for the definition of each variable.

[31] Regarding our main variables, we also note that now, board busyness has no impact on the performance of banks, contrary to the CEO duality and board education that have a positive impact.

Concerning Table 2.8, we also conclude that the quality of governance, measured by an index of governance, impacts positively on bank performance during the crisis. So, our conclusion is not sensitive to an alternative definition of the crisis period.

2.5.3 Additional econometric issues

Endogeneity is a common issue in governance studies that makes interpretation of the results difficult. As pointed out by Hermalin and Weisback (2003) the characteristics of the board and the performance of firms are endogenously, and not exogenously, determined. While this issue is less likely to be problematic in our analysis because the financial crisis is mostly an exogenous macroeconomic shock (Baek et al., 2004), we mitigate the endogeneity issue in some ways. First, we measure all the board variables at the end of 2006, just before the beginning of the crisis, whilst we measure performance during the crisis. Therefore, our empirical framework mitigates the endogeneity issue due to reverse causality as we regress bank crisis performance on (lagged) pre-crisis variables. Second, we examine board characteristics changes from 2005 to 2006. If boards of banks could have anticipated the crisis, it is expected that at least some board characteristics would have exhibited a drastic change. For example, boards could hire directors with more banking experience. Similarly, boards could increase their meeting frequency in order to deal with the looming crisis. However, the results in Table 2.9 show that there are no significant differences between 2005 and 2006 regarding the characteristics of the board, none of them is significantly different between the two years, indicating that the financial crisis is an unexpected event to the board of directors of banks.

Table 2.9 – Univariate comparison of board characteristics between 2005 and 2006

The table compares the characteristics of the board of banks in 2005 and 2006.

Variables	Mean 2005	Mean 2006	Test for Equality of Means (p-values)
Board independence	42.808	41.449	0.78
Board size	16.442	16.389	0.96
CEO Duality	0.086	0.069	0.72
Board experience	11.672	12.751	0.30
Board education	1.435	1.486	0.67
Women	11.359	10.872	0.80
Nationality_mix	0.208	0.209	0.98
Age diversity	7.525	7.485	0.93
Board busyness	2.735	2.631	0.54
Board activity	10.556	10.810	0.82

Asterisks indicate significance at the 1% (***), 5% (**) and 10% (*) levels, using a two-tailed test. Please refer to Appendix 2.1 for the definition of each variable.

2.6 Conclusion

In this paper we test if, and how, different supervisory characteristics affect bank performance during the 2007-2008 financial crisis. Using buy-and-hold stock return as a measure of bank performance, we find that the better-performing banks during the crisis had in 2006, less independent boards, boards with more banking experience and diversity (gender and age) and less busy supervisory directors. Also, such banks have lower returns in 2006, higher capital and market-to-book ratios, lower institutional ownership and possess a corporate governance committee. Our results are robust to an alternative definition of the crisis period as well as to the endogeneity issue.

The findings in our study support the notion that the characteristics of boards are an important determinant of bank performance and provide a clear understanding as to why some banks were more affected by the crisis than others. Thus, bank managers and shareholers as well as policymakers, regulators and other public entities should benefit from the findings of our research.

Appendices

Appendix 2.1 – Variables definitions

Variables	Definitions	Measurement period	Data sources
Bank performance	Buy-and-hold stock returns. Specifically, for each bank, the annual stock return is calculated as the natural logarithmic of the ratio of the stock price (adjusted), that is, $ln\ (P_{it}/P_{it-1})$.	July 2007 to December 2008; alternatively, January 2007 to September 2008	Datastream
Board independence	Percentage of independent directors, that is, the number of independent board directors on the board divided by board size.	December 2006	BoardEx
Board size	Total number of directors serving on the board of the bank.	December 2006	BoardEx
CEO duality	A dummy variable equal to 1 if the CEO is also the Chairman, 0 otherwise.	December 2006	BoardEx; Annual Reports
Board experience	Supervisory directors' average years of experience in the banking sector. To track banking experience we examine each supervisory director's biography as provided in the BoardEx database. First, we compute the number of years each supervisory director has worked in the banking sector and sum all these years. Second, we divide this total by the number of supervisory directors on the board of the bank.	December 2006	BoardEx
Board education	Average number of qualifications, that is, sum of the number of qualifications held by the supervisory directors divided by the total number of supervisory directors. All qualifications have a count of one.	December 2006	BoardEx
Women	Percentage of female supervisory directors on the board, that is, the number of woman supervisory directors divided by the total supervisory directors. Measures gender diversity.	December 2006	BoardEx
Nationality_mix	Proportion of supervisory directors from different countries. Measures nationality diversity.	December 2006	BoardEx
Age diversity	Standard deviation of supervisory directors' age. Measures age diversity.	December 2006	BoardEx
Board busyness	Average number of board positions (number of directorships) held by supervisory directors.	December 2006	BoardEx
Board activity	Annual number of board meetings.	December 2006	Datastream

Appendix 2.1 – Variables definitions *(cont.)*

Variables	Definitions	Measurement period	Data sources
2006 performance	Buy-and-hold stock returns.	January 2006 to December 2006	Datastream
Bank size	Natural logarithm of the bank's market capitalisation.	December 2006	Datastream
Capital	Bank capital, computed as the ratio of total equity to total assets.	December 2006	Datastream
MBR	Market-to-book ratio, that is, the ratio of the market value of equity to the book value of equity.	December 2006	Datastream
Institutional ownership	Percentage of shares owned by institutional investors.	December 2006	Thomson Financial
CG committee	A dummy variable equal to 1 if the bank has a corporate governance committee, 0 otherwise.	December 2006	BoardEx; Annual Reports
Governance index	Index of the quality of governance. For each characteristic (except for board size and for CEO duality), a dummy variable is defined, which is equal to 1 if the bank has better than the mean quality governance for that characteristic and 0 otherwise. For board size a value of 1 is assigned if it ranges between 8 and 12 members and 0 otherwise. For CEO duality a value of 1 is assigned if the CEO is not the Chairman and 0 otherwise. Governance index is the sum of all dummy variables. A higher value means better quality of governance.	December 2006	BoardEx; Annual Reports; Datastream
Institutions	The simple average of six governance indicators: (1) voice and accountability, (2) political stability, (3) government effectiveness, (4) regulatory quality, (5) rule of law and (6) control of corruption.	2006	Kaufmann et al. (2009)
ADRI	Antidirector rights. The corrected antidirector index of La Porta et al. (1998), by Spamann (2010).	2005	Spamann (2010)
Creditor rights	The index aggregating creditor rights by Djankov et al. (2007), following that constructed by La Porta et al. (1998).	2004	Djankov et al. (2007)

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CHAPTER 3

DETERMINANTS OF EUROPEAN BANKS' BAILOUTS FOLLOWING THE 2007-2008 FINANCIAL CRISIS

3 DETERMINANTS OF EUROPEAN BANKS' BAILOUTS FOLLOWING THE 2007-2008 FINANCIAL CRISIS

Abstract

Extraordinary amounts of public funds and/or assistance were made available to banks since the onset of the 2007-2008 financial crisis. Governments worldwide have launched a massive bailout package to support banks in distress.

Using a probit model, we analyse the likelihood of bailouts for a sample of 72 publicly listed European banks following the financial crisis.

Our results lead us to conclude that the governance characteristics of banks, specifically the features of boards, bank risks, as well as bank-level and country-specific banking sector variables, used as control variables, explain the likelihood of bailouts in the European banking sector.

Our study therefore suggests relevant policy implications, which might help supervisors, regulators and other public authorities in avoiding costly bailouts. Regarding our main variables, robust to numerous checks and additional tests, we find that board banking experience, longer directors' tenure and less busy boards decrease the likelihood of banks participating in a bailout programme. Inversely, credit and liquidity risks increase the probability of banks being bailed out. Additionally, some bank-level and country-level control variables also have predictive power. We highlight that the indicator of financial freedom, a regulatory environment variable, is positively related to the likelihood of bailouts in the European banking sector. Accordingly, fewer limitations on banking freedom and greater openness of the banking sector have a harmful impact on the occurrence of bailouts. Finally, we note that board independence and the existence of a corporate governance committee have, respectively, a positive and negative influence on the probability of bailouts and their significance is unchanged in almost all robust and additional tests.

Keywords: Corporate Governance, Banks, Financial Crisis, Risk, Bailouts.
JEL classification: G01; G21; G34.

3.1 Introduction

The global financial crisis, starting in 2007, generated numerous public interventions into banking systems. Given that the failure of many banks was imminent, governments all over the world enacted a variety of rescue plans to prevent wide scale financial collapse.[32] Among the many means of government intervention were: (1) direct equity injections, providing liquidity support to banks, (2) government guaranteed debt issuance programmes and the issuance of guarantees to reassure depositors and (3) purchases of distressed assets by the government or, more generally, the provision of mechanisms to relieve financial institutions from impaired or "toxic" assets (Breitenfellner and Wagner, 2010; Grossman and Woll, 2014).

Most of the government bailout programmes were a mix of distinct means of government interventions. The Troubled Asset Relief Program (TARP) in the United States (US) was a mix of equity injections and distressed asset purchases, while most of the European bailout programmes combined government guaranteed debt issuance programmes with direct equity injections (Breitenfellner and Wagner, 2010). More specifically, in the European Union (EU) most member states provided general guarantees for the whole banking system as well as support for the weakest banks, through guarantees on bank liabilities, capital injections, impaired asset relief and funding support. State aid to the banking system in each member state had to be notified to – and approved by – the European Commission's Directorate General for Competition, which aims to ensure that the measures do not distort competition. Since October 2008 hundreds of decisions authorising State aid measures were taken. The bulk of this aid represented guarantees on liabilities, with recapitalisations being the second most used support instrument.[33] However, member states have not actually used (or implemented) all the approved aid. In contrast to TARP, most of the aid did not take the form of capital injections but rather guarantees,[34] based on the idea that banks were not insolvent but simply suffering from a liquidity crisis. The expectation was that

[32] Although, according to some observers this massive intervention was necessary to keep the banking sector from collapsing, for others, it constituted an unacceptable gift to private institutions that will help them maintain unreasonable investment decisions in the future (Grossman and Woll, 2014).
[33] For detailed information see:
http://ec.europa.eu/competition/state_aid/scoreboard/financial_economic_crisis_aid_en.html
[34] Capital injections have been less common in the EU area than in the US.

guarantees and other liquidity-supporting measures would ensure that these would never result in actual losses for the states (Becht et al., 2011). Nevertheless, whenever it was clear that the banks were facing not only liquidity strains, but also potential risks to their solvency, several governments began to complement liability guarantee schemes with direct injections of capital into banks. For the EU countries, guarantees and other forms of liquidity support peaked in 2009. Support measures have commonly been accompanied by restrictions on dividend payments and on executive compensation, requirements for regular reporting on banking activity developments, government participation in the management of banks and restructuring requirements.

When banks have very serious financial problems, solving them will imply, very often, the need for bailouts, which are extremely costly. The enormous magnitude of the global financial crisis, illustrated by the unparalleled volume of government support packages for the financial system, has highlighted the need for a clear identification of the determinants of bailouts in the banking sector. However, the literature lacks a deep and detailed analysis of the factors that determine bailouts in the context of the financial crisis.

The aim of this paper is to fill this gap. Unlike previous studies that focus on the likelihood of financial distress or bankruptcy, which raises the question of defining the requirements, not always consensual, for a firm to be considered in financial distress[35/36] or in bankruptcy, in this study, we focus on bailouts, that can be considered a specific status in the firm's life, in the crisis context. So, our sample consists of banks which received government assistance, due to their critical financial distress status, in order to avoid the stage of bankruptcy. Hambrick and D'Aveni (1988, p. 1) describe bankruptcy as a "*protracted process of decline*" and a "*downward spiral*". Consequently, substantial financial distress effects are incurred well prior to default (Elloumi and Gueyié, 2001). Fich and Slezak (2008) identify the various aspects of a firm's governance structure that affect the probability and the predictability of bankruptcy once the firm has entered the state of financial distress. Overall, their findings indicate that governance characteristics are associated with the likelihood that financially

[35] "*Different countries have different accounting procedures and rules, and the definition of financial distress put forward by different scholars is not always the same*" (Geng et al., 2015, p. 236).
[36] For example, according to Baldwin and Mason (1983, p. 505) "*when a firm's business deteriorates to the point where it cannot meet its financial obligations, the firm is said to have entered the state of financial distress*."

distressed firms become bankrupt. Bailed-out banks are, by definition, in some sort of distress and exhibit high risk (Dam and Koetter, 2012). According to Miglani et al. (2015) few prior studies have examined the direct association between various corporate governance attributes and the financial distress of firms. Some exceptions are Elloumi and Gueyié (2001) for Canadian firms, Tsun-Siou and Yin-Hua (2004) for Taiwanese firms, Abdullah (2006) for Malaysian firms and Miglani et al. (2015) for Australian firms. Also, and even more clearly, the literature that analyses the determinants of the probability of bailouts of banks in the financial crisis, including governance mechanisms, either in a cross-country or in a single country context, is to the best of our knowledge almost non-existent.[37] However, there is some literature that examines how bailout plans in the context of the financial crisis should be arranged (e.g., Bebchuk, 2009; Hoshi and Kashyap, 2010). A proper rescue package avoids principal agent conflicts, while providing immediate liquidity to institutions which are in the state of distress (Breitenfellner and Wagner, 2010).

The board of directors is central to corporate governance in market economies (John and Senbet, 1998), serving as a firm's internal monitoring mechanism (Walsh and Seward, 1990). Actually, being the "ultimate centre of control" of a firm (Mizruchi, 1983), the board is responsible for its health and survival and thus, for the potential need of a bailout. "*The ability of a board to recommend appropriate actions and to monitor the implementation of these recommendations is likely to determine the financial position of the firm and the outcome of a bankruptcy proceeding*" (Robinson et al., 2012, p. 271), as well as the outcome of a financial distress process. Governments also rely on the effectiveness of the board of a bank when approving bailout packages, usually accompanied by the approval of reorganisation plans.

Corporate boards of directors are responsible for different tasks and responsibilities. "*Among these, and possibly the most critical is the obligation to maintain the firm's solvency*" (Platt and Platt, 2012, p. 1139). The relevance of this role by a board of directors becomes clear following the financial crisis, which forced so many firms to request State support. Previous studies have acknowledged that the board's functions of monitoring, advising and providing resources are essential to any

[37] The exceptions are the studies of Adams (2012) and Carty and Weiss (2012) both analysing the US Federal Government bailout programmes.

firm's survival but they do not devote attention to how board configuration influences the probability of bailouts of banks in the financial crisis. So, our first research question is whether bank board characteristics prior to the financial crisis affect the likelihood of bank bailouts following the crisis.

The financial crisis has also raised questions related to risk measurement, risk growth and risk management within financial organisations in general and banks in particular. So, our second research question is whether the specific risks levels of banks – such as credit risk, liquidity risk and growth risk – before the crisis influence the probability of receiving bailouts following the crisis and, consequently, whether the presence of such risks has explanatory power in predicting bailouts. If this relationship exists then a proper and regular assessment/analysis of risk can mitigate or even avoid bank bailouts.

Finally, our third research question is whether the pre-crisis size of banks, in order to analyse the well-known "too-big-to-fail" issue and the pre-crisis bank capital, an important indicator of bank health under the Basel framework, is related to the likelihood of banks being bailed out following the crisis.

We examine the effect of the board of banks, specific risks levels of banks, size and capital of banks capital immediately prior to the financial crisis (2006) on the likelihood of bailouts following the crisis (2007 to 2009). Additionally, we include a set of control variables: bank-level and country-level control variables. We measure the variables before the crisis for two main reasons. First, since the effects of the crisis are overwhelming it is crucial to know if, and how, boards, specific risks levels, size and capital determine the probability of bank rescue from financial distress, in order to avoid bankruptcy, thereby influencing banking stability. For example, it is very useful to be aware whether a bank that has more experienced boards when entering the crisis will benefit from this greater experience following the crisis. Thus, we attempt to identify, at a bank level, early warning indicators of bank bailouts. Second, this approach mitigates endogeneity concerns because we use lagged independent variables to explain the probability of bailout, which makes it less likely that these variables are jointly determined.

Our study contributes to the ongoing debate regarding appropriate regulatory reform in the banking system by shedding light on the extent to which bank-specific

corporate governance characteristics and in particular the features of the board of banks, which is one of the main governance mechanisms, specific risks levels of banks, bank size and bank capital have an impact on the likelihood of bailouts and, consequently, on the stability/fragility of the banking system. The severity of the financial crisis has produced strong pressure in favour of reforming financial regulation. So, by analysing the determinants of the likelihood of banks receiving State aid, our study helps public authorities in the process of introducting new recommendations, rules and practices, namely in their corporate governance codes, in order to prevent or mitigate a collapse in the future and, thus, promote stability. In short, our findings provide useful insights into the determinants of the banking sector health in Europe and, thereby, they are helpful in assisting banking supervisors and regulators in their task of guaranteeing a stable system.

Our paper seeks to contribute to the existing literature in four ways. First, unlike previous studies that analyse firms' probability of financial distress or bankruptcy in individual countries or groups of countries outside of Europe, we focus on the likelihood of bailout occurrence for banks in 17 European countries. We are not interested in financial distress *per se* nor in bankruptcy, but rather in financial distress that due to bailouts do not reach the stage of bankruptcy. So, we focus on a specific and different dimension of financial distress. Second, our paper adds to the literature that examines the influence of the features of the board on bank life as it provides a detailed analysis of the impact of the characteristics of the board on bailouts. Therefore, it may be useful in the process of (re)configuring boards and may assist directors in taking steps that will decrease the likelihood of State aid. Third, we also include in our study the examination of the role of the specific risks of banks in predicting bailouts, using accounting and market measures. So, risk indicators are explicitly incorporated in our model.

In short, our findings show that different characteristics of the board of banks and types of risks help, in fact, to predict bailouts. Additionally, we find statistical significance for some control variables as is the case of concentration in the banking industry and financial freedom, a regulatory environment variable.

Many banks had to be bailed out by their governments. It is believed that an analysis of the factors that led to the problems suffered by banks in Europe will be of

enormous benefit. First, the findings can help banking authorities in their duty of ensuring a stable financial system. Second, the early detection of potential problems is likely to help reduce the expected cost of State aid and to decrease the likelihood of the problem spreading more widely through the financial system due to banking interconnectedness.

The remainder of the study proceeds as follows. Section 3.2 present the literature review and the hypotheses development, Section 3.3 describes the data and methodology, Section 3.4 provides the empirical results and Section 3.5 provides the conclusion.

3.2 Literature review and hypotheses development

In this section, we review the existing literature to help formulate our empirical hypotheses regarding the determinants of the likelihood of banks receiving bailouts following the financial crisis, that support our model. We point out that given the fact that the literature which focuses on bailouts in the context of the crisis is practically inexistent, we refer several times to the available literature relating to financial distress and bankruptcy as a basis for the formulation of our hypotheses. Our main explanatory variables can be aggregated in three groups of variables: governance, types of bank risks and other relevant characteristics of banks. In the first group we include the characteristics of the board, given that it is one of the main internal mechanisms of governance. In the second group we include three different types of bank risk: credit risk, liquidity risk and growth risk. Finally, in the third group we include bank size, in order to analyse the "too-big-to-fail" issue, and bank capital, which gained increased relevance in the context of the financial crisis.

3.2.1 Board independence and bailouts

Board composition critically influences the success of a firm (Hsu and Wu, 2014). Hambrick and D'Aveni (1992) argue that corporate failure may occur when the

composition of a board is imbalanced or inadequate. So, incorrect representation of independent directors may affect a firm's ability to survive. However, for Chaganti et al. (1985) the percentage of outsiders is not associated with the failure process. Also, others studies report that board independence is not related to bankruptcy, but when interacting with other governance attributes it has significant impact. Daily and Dalton (1994b) show that neither the number of independent directors nor the proportion of such directors are associated with bankruptcy, but the effect of the interaction between the percentage of independent directors and the joint Chief Executive Officer (CEO)/Chairman roles is strongly related to bankruptcy. Identically, for Lajili and Zéghal (2010) the proportion of independent directors is positively but not significantly associated with the likelihood of bankruptcy. Nevertheless, the three-way interaction term between independence, cumulative blockholding and duality structure show a positive and significant relationship in their study.

Concerning financial distress in banking firms, according to Simpson and Gleason (1999) the percentage of insiders on the board does not appear to impact future financial distress. Also, Abdullah (2006) does not support the contention that board independence is significant in explaining a non-financial firm's distressed status. More recently, Brédart (2014a), Brédart (2014b) and Miglani et al. (2015) show that the impact of board independence on the occurrence of financial distress is not significant. On the contrary, Elloumi and Gueyié (2001) find that the proportion of outside directors is negatively associated with financial distress status. So, boards of financially distressed firms have significantly fewer outside members. Regarding bankruptcy, Daily and Dalton (1994a) show evidence that bankrupt firms have a higher proportion of affiliated directors. The structure-composition interaction term (the interaction between CEO/Chairman structure and the proportion of affiliated directors) is significant as well. Additionally, Platt and Platt (2012) comparing non-bankrupt firms with bankrupt firms conclude that non-bankrupt firms have a higher percentage of independent directors. However, more recently, Hsu and Wu (2014) examining the effect of board composition on the likelihood of corporate failure in the United Kingdom between 1997 and 2010, demonstrate that the likelihood of corporate failure is positively related to the proportion of independent directors on boards.

In the context of the financial crisis, Adams (2012) compares a set of selected

governance characteristics in 2007 between sample banks that received bailout money from the US government in 2008 and beginning of 2009 (up until April 10, 2009) and sample banks that survived until April, 2009 and did not receive bailout money and she concludes that banks receiving bailout money had boards that were more independent. According to Adams (2012), this suggests that board independence may not necessarily be beneficial for banks. Independent directors may not always have the required expertise to oversee complex banking firms. Regarding the advisory role of boards, the lack of firm-specific knowledge on the part of independent directors may compromise their effectiveness and, so, explaining the positive relationship between the incidence of bailouts and board independence. The above arguments lead us to the first hypothesis (H_1):

H_1: Board independence increases the likelihood of a bank participating in a bailout programme following the financial crisis.

3.2.2 Board size and bailouts

Board size has a number of implications for the functioning of the board (Chaganti et al., 1985). The results regarding the influence of board size on corporate survival are inconclusive.

Jensen (1993) proposes that a small number of board members produces a more effective control mechanism. Larger boards may not be able to act effectively as a controlling body as they may have difficulties in coordinating their efforts, which leaves management relatively free to pursue their own goals (Chaganti et al., 1985). In addition, a smaller board may benefit from its ability to make decisions more quickly and avoid time-consuming debates.

However, a smaller board may more easily be influenced by the CEO and, also, a larger board tends to offer a wider range of experience, skills and different views (Simpson and Gleason, 1999; Platt and Platt, 2012). Some studies support these arguments (Chaganti et al., 1985; Platt and Platt, 2012; Brédart, 2014b). Chaganti et al. (1985) find that non-failed retailing firms tend to have bigger boards than failed ones and Platt and Platt (2012) indicate that a smaller board is positively associated with

bankrupt firms. In the period leading up to bankruptcy declaration, declining firms experience a decrease in board size (Gales and Kesner, 1994). Also, Brédart (2014b) shows a negative association between board size and financial distress. Additionally, for Brédart (2014a) the hypothesis which suggests that the board size has a negative impact on financial distress probability is partially supported by his model.

In contrast, other studies contradict this evidence. For Simpson and Gleason (1999) the number of directors on the board does not appear to impact future financial distress and Elloumi and Gueyié (2001) report that there is no significant difference between the board size of the financially distressed and healthy firms. Additionally, Lajili and Zéghal (2010) and Darrat et al. (2014) report that board size is not significantly associated with the likelihood of bankruptcy. Moreover, Darrat et al. (2014) note that the interaction between board size and the complexity dummy variable is significantly negative.

Some other studies support the advantages of smaller boards (Fich and Slezak, 2008; Adams, 2012; Salloum and Azoury, 2012). Fich and Slezak (2008) contend that distressed firms with smaller boards are more likely to avoid bankruptcy, meaning that board size is significantly positively related to the probability of bankruptcy. Also, according to Salloum and Azoury (2012) board size and financial distress are positively correlated. In the financial crisis, Adams (2012) compares banks that received TARP money in 2008 and 2009 to those that did not and concludes that banks with TARP funds have larger boards. The second hypothesis (H_2) is then stated as follows:

H_2: Board size increases the likelihood of a bank participating in a bailout programme following the financial crisis.

3.2.3 CEO duality and bailouts

The global financial crisis raises many governance issues regarding the role and responsibilities of board members. Simultaneously, CEO duality has come under renewed scrutiny because of the perceived loss of board vigilance and resultant abuse of power. Therefore, the financial crisis presents a unique opportunity to study the consequences of CEO duality, which are more likely to be observable in this context

characterised by perceived extremes of risk taking and large-scale organisational bailouts or even failure, than in "normal" times. Carty and Weiss (2012) investigate whether CEO duality is associated with the receipt of bailout funds by publicly traded banks in the US and they do not find evidence that banks with a dual CEO corporate governance structure are more likely to participate in the Federal Government's bailout programmes. Consistent with this view, other studies do not find a significant association between duality and the probability of financial distress (Elloumi and Gueyié, 2001; Abdullah, 2006; Miglani et al., 2015). Similarly, in the US context and for the period from mid-2007 to 2009, Brédart (2014b) reports that the relationship between CEO duality and financial distress is not significant. In another study, Brédart (2014a) divides the referred period into two sub-periods: before 15 September 2008 and after 15 September 2008, which correspond to the Lehman Brothers bankruptcy. For the first sub-period, the impact of CEO duality on financial distress probability is negative and significant, whereas for the second sub-period the impact is positive but not significant. The lack of significant results in relation to the CEO duality variable raises concerns about the efficacy of separating the positions of CEO and Chairman on financial distress probability. The absence of predictive power of the CEO duality variable indicates that there is no difference regarding this variable between healthy and financially distressed firms. Previously, Daily and Dalton (1994b) have evidenced that bankrupt firms are not more likely to be associated with the joint CEO/board structures but firms that are simultaneously characterised by joint CEO/Chairman structures and lower proportions of independent directors are associated with bankruptcy. Additionally, Chaganti et al. (1985) have found no difference in the incidence of CEO duality, in each of the 5 years preceding failure, for failed as compared to non-failed retailing firms. In the same way Lajili and Zéghal (2010) note that the duality structure is not a significant governance variable that affects the likelihood of bankruptcy, but when combined with board independence and cumulative blockholding the impact is positively significant.

On the contrary, for Simpson and Gleason (1999) the combination of CEO and the Chairman of the board into one position reduces the probability of financial distress in banks. So, banks where the same person is both the CEO and Chairman of the board have a lower probability of financial distress. In other words, combining the functions

of CEO and Chairman is beneficial to the firm's survival. However, it has been repeatedly emphasised that boards are more effective when one person does not simultaneously occupy the positions of CEO and Chairman. Lorsch and MacIver (1989, p. 185) specifically suggest that "*providing a leader [of the board] separate from the CEO could significantly help directors prevent crises, as well as to act swiftly when one occurs*." Evidence by Hambrick and D'Aveni (1992) supports this idea as they report that dominant CEOs are more likely to be associated with firm bankruptcy. Also, other studies report that this duality is more prevalent in bankrupt firms (e.g., Daily and Dalton, 1994a; Darrat et al., 2014). Daily and Dalton (1994a) and Darrat et al. (2014), for example, find that firms with the CEO serving simultaneously as Chairman of the board are more likely to go bankrupt than are survivor firms. In addition, Daily and Dalton (1994a) reach exactly the same conclusion relative to the interaction between CEO duality and the percentage of affiliated directors. Based on the previous arguments, although not specific and directly related to bailouts, we predict the third hypothesis (H_3) as follows:

H_3: Dual CEO corporate governance structure increases the likelihood of a bank participating in a bailout programme following the financial crisis.

3.2.4 Board experience and bailouts

Operations of some firms are more technically demanding, thereby requiring specialist knowledge (Darrat et al., 2014) as is the case of banks. Industry expertise equips directors with a deeper understanding of the more complex financial instruments and transactions, industry dynamics and regulatory environment. Additionally, boards with financial experience have a better comprehension of the more opaque assets and complex activities, but financially experienced boards must also be given the right incentives to dissuade them from taking excessive risks (Becht et al., 2011). On the one hand, boards with significant financial expertise should moderate risk exposure at their financial institutions and consequently mitigate or even prevent losses. A more financially knowledgeable board can recognise risks that will not pay off or that are unsound for the financial stability of the bank and can advise managers on avoiding

such risks. On the other hand, financial experts on the board might recognise the government guarantee offered to banks and, consequently, be encouraged to pursue more risk-taking activities.[38]

Concerning the financial crisis we expect that financial/banking experience plays a key role. An analysis of Lehman Brothers and Merrill Lynch prior to their collapse shows that their boards of directors lacked sufficient financial expertise (Fernandes and Fich, 2013). Hau and Thum (2009) find evidence that the lack of financial experience of board members in German banks was strongly positively related to losses by the banks. In a sample of banks bailed out under the TARP, Fernandes and Fich (2013) show that the probability of a bailout decreases as experience increases. Also, bailout funds as a fraction of bank assets decrease as banking experience increases. Overall, the results indicate that banks with banking experts on their boards are less likely to be bailed out. So, the banking experience of boards is expected to equally be of great relevance concerning the probability of bailouts of banks in Europe, providing them monitoring and advisory advantages. The fourth hypothesis (H_4) is then stated as follows:

H_4: Supervisory directors' banking experience decreases the likelihood of a bank participating in a bailout programme following the financial crisis.

3.2.5 Director tenure and bailouts

The question of dealing with the length of service period or tenure should directly impact the way firms are governed (Lajili and Zéghal, 2010). Short tenure directors and long tenure directors do not have the same knowledge of the firm (Salloum and Azoury, 2012). Boards with low tenure lack internal knowledge of the firm and industry specific issues and thus, are not as effective in decision making as boards with longer tenure (Muller-Kahle and Lewellyn, 2011). On the other hand, Katz (1982) find that extended tenure decreases intra-group communication and isolates groups from key information sources. Furthermore, extended tenure may magnify agency problems between insiders and outsiders (McNulty et al., 2013).

[38] "While policy circles have discussed the impact of independent directors with little financial experience (…) a dark side to expertise may be further alignment with risk-taking incentives" (Mehran et al., 2011, p. 10).

However, Vance (1983) contends that forcing directors to retire leads to a waste of talent and experience. By being allowed to serve more time on the board, supervisory directors could gain more intrinsic and precious knowledge about the firm's business environment, products and markets, as well as its financial position and growth strategies (Lajili and Zéghal, 2010). Also, long director tenure enables greater experience with the firm's strategies and policies. Effective monitoring managerial behaviour requires good knowledge of the firm and short tenured directors may not have sufficient firm-specific knowledge to control managers. This firm-specific knowledge obtained over time helps reduce information asymmetry between the board and management (Kim et al., 2014). Additionally, boards with low tenure are more likely to engage in fraudulent financial reporting (Beasley, 1996), suggesting that at low levels of tenure boards are more likely to acquiesce to management (Muller-Kahle and Lewellyn, 2011). The results of the study by Lajili and Zéghal (2010) indicate that independent directors' tenure on the board of the financially distressed firms is generally lower than independent directors' tenure in financially healthy firms. On the contrary, Berberich and Niu (2011) find that long-serving directors are more likely to be associated with governance problems[39] at the firms they oversee. However, for Salloum and Azoury (2012) it is equally probable (or improbable) that short-serving directors will be associated with financially distressed family business firms.

In the context of the subprime lending, and using a sample of financial firms over the period 1997-2005, Muller-Kahle and Lewellyn (2011) find that the board configuration of the financial institutions that engaged in subprime lending were significantly different from those that did not. Specifically, subprime lenders had less board tenure. Hence, board tenure is negatively related to the decision to specialise in subprime lending.

Effective corporate governance in banking firms should include monitors with the ability to identify and reverse undesirable bank-specific conditions and advisers that, knowing the bank's particularities in great detail, enable better decision-making. Considering the special nature of banks, by extending the tenure on the boards,

[39] For Berberich and Niu (2011, p. 3) "*A "governance problem" refers to a situation where a director has served on the board of a company that has suffered a corporate bankruptcy, major litigation or regulatory infraction, major accounting restatement, or other similarly major corporate scandal."*

supervisory directors are in a better position to effectively monitor, detect and control opportunistic managerial behaviour in a timely manner, as well as to provide valuable and appropriate advice, thus potentially avoiding bailouts of banks. Supervisory directors with relatively short tenure on the board would be unable to detect signs of the severity of the problems, as in the pre-crisis period, and respond in a timely manner to problems arising from the activities of the bank on whose board they serve, making it more likely to be bailed out. Therefore, we formulate the fifth hypothesis (H_5) as follows:

H_5: The longer the supervisory directors have served on the board, the less the likelihood of a bank participating in a bailout programme following the financial crisis.

3.2.6 Board busyness and bailouts

More recent theoretical and empirical research highlights the importance of busy directors for the board process. Nevertheless, there is compelling theory and evidence to support competing positions on the governance impact of busy directors.

The first perspective, referred to as the *Reputational Hypothesis*, originates from the resource dependence theory literature. It reflects the view that busy directors are preferred due to their superior ability as they are familiar with different managerial styles and business strategies. Also, busy directors bring a useful network and business contacts.

The second view of the role of busy directors comes from the agency theory literature and is called *Busyness Hypothesis*. It asserts that serving on multiple boards overcommits a director, which results in the director becoming too busy to adequately monitor management or, otherwise, shirking their governance responsibilities. The point behind the problem of busy directors is that, the busier a director is, the less effort he/she devotes to each of his/her tasks. So, multiple board appointments can adversely affect a board's decision-making effectiveness. However, according to the *Reputational Hypothesis* the directors who are considered "busy" or "extremely busy" are chosen to be on so many boards precisely because of their high ability, which serves to offset the effect of their insufficient time.

In accordance with the *Busyness Hypothesis*, Beasley (1996) finds that as the number of outside directorships in other firms held by outside directors decreases, the likelihood of financial statement fraud decreases. Forbes and Milliken (1999) argue that effort level is an important determinant of the effectiveness of boards as decision-making groups and Muller-Kahle and Lewellyn (2011) provide evidence that effort levels by board members decrease when directors serve on several boards. Thus, busy directors will not be able to devote sufficient effort to any one board, which provides support for the *Busyness Hypothesis*. Elloumi and Gueyié (2001) show that the likelihood of financial distress increases as outside directors hold more directorships. This result is consistent with the view that additional directorships held by outside directors distract these directors from their monitoring responsibilities, thereby increasing the likelihood of financial distress. In the same way, Berberich and Niu (2011) document a positive relationship between director busyness and the likelihood of encountering governance problems, which suggests that holding too many board appointments has a detrimental effect on corporate governance. Further, Muller-Kahle and Lewellyn (2011) find a positive relationship between busy outside directors and subprime lending. Thus, subprime lenders had boards that were busier. Decisions by financial institutions to engage heavily in subprime lending may have arisen from the board being busy with the tasks of others firms, consequently lacking time and motivation to put in the effort required to provide significant and proper strategic guidance. "*Thus, firms with busy boards are more likely to suffer from ineffective group decision making that could lead to financial firms choosing to take part in subprime lending*" (Muller-Kahle and Lewellyn, 2011, p. 448) and, thereby, to participate in a bailout programme. In accordance with previous studies we expect to confirm the *Busyness Hypothesis*. Accordingly, we state the sixth hypothesis (H_6) as follows:

H_6: Busier supervisory directors on the board increase the likelihood of a bank participating in a bailout programme.

3.2.7 Bank specific risks and bailouts

The financial crisis has led to a further growing awareness and need for appropriate risk analysis in its different components. In quantitative risk management, the focus lies on how to enhance the measurement and management of specific risks such as liquidity risk, credit risk and market risk (Aebi et al., 2012). Also, the constant evaluation of the levels of risk is of extreme importance. In spite of the increasing emphasis on risk analysis, many financial institutions are still using reactive rather than proactive methods of risk monitoring and detection (Sabato, 2010).

Bank soundness can be affected by different sources of risk, such as credit risk and liquidity risk (Poghosyan and Čihak, 2011) and so we examine whether, and how, various bank specific risks affect the likelihood of being bailed out. If there is a relationship, then regular monitoring of risk and early detection of related potential problems may help to prevent/mitigate government assistance. In order to capture bank specific risks, (i.e. credit risk, liquidity risk and growth risk of the equity markets), indicators from the balance sheets of banks and from the market are used.

The deterioration in the quality of banks' loan portfolio has been at the centre of episodes of costly banking system distress and economic crises in both developing and advanced economies, and the 2008 global financial crisis is no exception (Nkusu, 2011). Also, one of the main reasons often cited as being at the root of the Asian financial crisis is that the financial sector was not properly supervised and regulated, with the result that banking institutions accumulated large amounts of non-performing loans (NPLs), not provided for in capital and reserves (Rahman et al., 2004). Most troubled banks have problems in their loan portfolio. Thus, bad loans were, in fact, a major problem for banks in Asia. In addition, the financial crises of 1997 and 1998 revealed some weaknesses in the systems for monitoring the credit risk (Wanke et al., 2015). Since loans exhibit the highest default rates, the asset quality of a bank will decline when there is an increasing number of NPLs. With worsening loan quality, more NPLs will have to be written off the books when they are declared worthless by the bank (Rahman et al., 2004). Stressing the key role non-performing plays in banking crises, Kaminsky and Reinhart (1999) suggest that a large increase in NPLs could seen as marking the onset of a crisis. Similarly, for Davis and Karim (2008) a symptom of

banking crises is increased credit risk or the probability that a borrower will default, converting an asset into a "bad" or non-performing loan. "*Although banks enjoy advantages in screening and monitoring borrowers, both of which reduce credit risk, the high levels of NPLs associated with crises indicate risk assessment by banks deteriorates during pre-crisis periods*" (Davis and Karim, 2008, p. 93). Cipollini and Fiordelisi (2012) find that a higher proportion of NPLs increases the probability of observed distressed Shareholder Value Ratio. Similarly, Mayes and Stremmel (2012) show that NPLs positively influence the likelihood of bank distress. Also, Dam and Koetter (2012) show that credit risk is associated with a higher expected bailout probability. Thus, the seventh hypothesis and the first related to bank specific risks ($H_{7.1}$) is the stated as follows:

$H_{7.1}$: Credit risk increases the likelihood of a bank participating in a bailout programme.

Banks need liquidity to meet deposit withdrawals and satisfy customer loan demand. Liquidity risk at banks can be defined as the likelihood that the demand for cash by bank customers exceeds the bank's ready supply of cash (DeYoung and Jang, 2016). Liquidity risk arises from the inability of a bank to accommodate decreases in liabilities or to fund increases in assets (Cipollini and Fiordelisi, 2012).

Faced with liquidity risk, a bank may be forced to borrow emergency funds at an excessive cost to cover its immediate cash needs, hence reducing its earnings (Rahman et al., 2004). Banks need to have sufficient liquidity assets to avoid incurring a high liquidity risk. This ensures that immediate funds will be available at the lowest cost. According to the Basel Committee on Banking Supervision (BCBS) "*liquidity is the ability of a bank to fund increases in assets and meet obligations as they come due, without incurring unacceptable losses*" (BCBS, 2008, p. 1). High cash holding can reduce liquidity risk for banks and can help them survive (Berger and Bouwman, 2013) however, they can also be associated with agency problems (Jensen, 1986). Concerning non-financial firms Elloumi and Gueyié (2001) show that financially distressed firms have significantly less liquidity than healthy firms. Also, Mayes and Stremmel (2012), using as measure of liquidity the loan-to-deposit ratio find that the lack of liquidity influences positively the likelihood of bank distress. Additionally, to control for liquidity risk Dam and Koetter (2012) use the sum of cash and overnight interbank

assets to total assets and conclude that liquidity is not significant in explaining the probability of bank bailouts during 1995-2006. Betz et al. (2014), using two different indicators for liquidity, find that a high dependency on short-term borrowing increases the probability of bank distress, while deposits to funding ratio is not statistically significant at 10% level.

In the context of the financial crisis and in accordance with the BCBS, which emphasises the importance of liquidity to the functioning of financial markets and the banking sector, as well as the need for adequate risk management (BCBS, 2008), the seventh hypothesis and the second related to bank specific risks ($H_{7.2}$) is stated as follows:

$H_{7.2}$: Liquidity risk increases the likelihood of a bank participating in a bailout programme.

Finally, we analyse the growth risk measured by market-to-book ratio. Since book value does not include future growth potential but market value does, the ratio of the market value to the book value is expected to be higher for a firm that is perceived to have many growth opportunities (Ramezani et al., 2002). Therefore, the deviation of market value from book value depends on the expected growth opportunities and so, it reflects investor expectations regarding the future growth of the firm. Market-to-book ratio is considered a good proxy for the presence of profitable growth options (Ramezani et al., 2002), measuring the market‘s perception of the firm (Rose and Thomsen, 2004). Therefore, it may also be used as a proxy for growth risk. Higher market-to-book ratios may signal aggressive and riskier strategies to support a higher market evaluation of the growth opportunities materialised, for example, in the loosening of lending and other banking activity standards. Accordingly, the seventh hypothesis and the third related to bank specific risks ($H_{7.3}$) is stated as follows:

$H_{7.3}$: Growth risk increases the likelihood of a bank participating in a bailout programme.

3.2.8 Bank size and bailouts

Large banks have received generous sums of government money and other support measures in order to keep them afloat, given their looming insolvency. "*The argument for such policy intervention is that some banks are of a size (and with so important interconnections with other banks) that gives them system-wide relevance*" (Rötheli, 2010, p. 123). The failure of a large financial institution will have ramifications for other financial institutions and therefore the risk to the economy would be enormous (Helwege, 2010). For Panageas (2010) governments sponsored bailouts given that some of the financial institutions were considered "too-big-to-fail".

The unprecedented bailouts of large and systemically important banks in the US and Europe during the ongoing global financial crisis show the relevance of "too-big-to-fail" (Völz and Wedow, 2011). Bailouts are a form of State intervention in the economy with relevant redistributive effects, and economists have alerted against the moral hazard problem they create and their welfare reducing effects (Grossman and Woll, 2014). On the one hand, public bailouts become necessary because the collapse of large banks can impose substantial costs on the real economy. On the other hand, government support of "too-big-to-fail" financial institutions during the crisis provided incontestable proof that these institutions benefit from large explicit and implicit public subsidies, including the expectation that they will receive similar public support during future emergencies (Wilmarth Jr., 2011). In this way, public bailouts can create moral hazard problems. Banks have an incentive to grow to a size that, in case of misfortune, ensures that they are saved (Stern and Feldman, 2004).

Size and importance of individual banks seem to matter, as governments can allow individual banks to fail if they do not represent an important part of the national banking sector (Grossman and Woll, 2014). Fernandes and Fich (2013) find that the probability of a bank being bailed out increases as its size increases. This result is in accordance with the commonly held view that many banks were bailed out because they were deemed "too-big-to-fail" by regulators. Large banks are likely to play a greater role in a country´s economic performance and thus may be more likely to receive bailouts. Thus, the eighth hypothesis (H_8) is formulated as follows:

H_8: Bank size increases the likelihood of a bank participating in a bailout programme.

3.2.9 Bank capital and bailouts

The financial crisis raises fundamental issues about the role of bank capital, especially from the standpoint of bank survival. Not surprisingly, public requirement for more bank capital tends to be greater after financial crises and reform proposals usually focus on how capital regulation should adapt to prevent future crises (Berger and Bouwman, 2013). Various proposals have been presented and approved as is the case of "Basel III", a set of reform measures developed by the BCBS following the 2007-2008 financial crisis.

Bank survival is central not only in strategic decisions made by banks, but also in decisions made by regulators worried about banking stability (Berger and Bouwman, 2013). In the Basel framework bank capital is a main variable for ensuring healthy banks. Also, many theories suggest that capital improves a bank's survival probability. On the one hand, bank capital serves as a cushion to absorb losses and shocks (Rahman et al., 2004; Repullo, 2004; Poghosyan and Čihak, 2011). A higher level of capital acts as a buffer against financial losses, protecting a bank's solvency, and is expected to decrease the probability of a bank failure (Rahman et al., 2004; Betz et al., 2014). On the other hand, bank capital has a direct positive effect on monitoring incentive, as well as reducing the probability of default (Mehran and Thakor, 2011).

Cole and White (2012) use proxies for the CAMELS indicators[40] to explain banking failures in the recent financial crisis and they find that capital is one of the factors that explains bank failures during 2009. Berger et al. (2012) analyse the role of corporate governance on US commercial bank failures during the financial crisis and also find that larger amounts of capital decrease the probability of default. Finally, Berger and Bouwman (2013) show that having more capital increases the probability of survival of small banks at all times and of medium and large banks during banking crises. According with the arguments presented above, the ninth hypothesis (H_9) is formulated as follows:

H_9: Bank capital level decreases the likelihood of a bank participating in a bailout programme.

[40] CAMELS is an acronym for capital adequacy, asset quality, management, earnings, liquidity and sensitivity to market risk that is used by bank supervisors.

3.3 Data and methodology

In this section we first describe the sample and explain the process of collecting data in order to construct our dependent variable. Next, we discuss the variables and, finally, we present the empirical framework.

3.3.1 Sample and data sources

In our sample of 72 publicly listed European banks we are interested in the troubled banks, which received different types of State assistance (recapitalisation, guarantees or other aid) from their national government so as to avoid failure or dissolution. To identify such banks we use various sources of information.

Our first source is the European Commission website, in which we run detailed searches on the individual banks (specifically, http://europa.eu/rapid/search.htm and http://ec.europa.eu/competition/state_aid/scoreboard/financial_economic_crisis_aid_en.html). We combine this source with two other sources: the annual reports and other documents available on the bank's official website. Additionally, we conduct keyword Google searches using a combination of: (1) the name of each bank in our sample, (2) the terms "bailout", "bailed out", "rescue", "capital injection", "recapitalisation", "guarantee" or "aid" and (3) the words "government" or "State." Based on all these searches, we create a bank bailout dummy variable equal to one if there is at least one reference to "bailout" for the particular bank during the interval 2007-2009.[41] We are interested in whether a specific bank is bailed out, not in the total number of bailouts. More specifically, the distribution of the number of bailouts in each year is as follows: 1 bailout in 2007, 20 bailouts in 2008 and 25 bailouts in 2009. There were 19 banks that were bailed out once, 12 banks that were bailed out twice and 1 bank that was bailed out three times.

[41] The results of our study are unchanged over the period 2007-2011. All banks that received aid in 2010 and 2011 had already received assistance in the previous period.

Further, concerning independent and control variables, data has been extracted from several other sources: BoardEx, Datastream, Thomson Financial, annual reports, World Bank and Heritage Foundation websites.

3.3.2 Variables description

In this sub-section we characterise, in detail, all the variables used in our study: the dependent binary variable, the main explanatory variables and the control variables. Please see Appendix 3.1.

3.3.2.1 Bailout variable

A dichotomous qualitative dependent variable is used in this study, which we call *Bank bailout*. *Bank bailout* is a binary variable taking the value of one for a bailed-out bank and zero otherwise.

3.3.2.2 Board characteristics variables

Our variables of interest regarding the board of banks are: *Board independence, Board size, CEO duality, Board experience, Director tenure* and *Board busyness*. *Board independence* is defined as the percentage of independent directors. *Board size* is defined as the total number of directors on the board. *CEO duality* is a dummy variable with a value of one if the CEO is also the Chairman of the board and zero otherwise. *Board experience* is measured as the average years of experience in the banking sector of the supervisory directors and *Director tenure* is measured as the average length of time, stated in years, that the supervisory directors have been on the board of the bank. Said differently, it is the average number of years that the supervisory directors have served on the board of the bank. Finally, *Board busyness* is measured as the average number of board positions (number of directorships) held by supervisory directors.

3.3.2.3 Risk variables

We include a set of variables in order to capture various aspects of a bank's vulnerability: *Credit risk* (or default risk), *Liquidity risk* and *Growth risk*. Information from the balance sheets of banks as well as the market is used to measure bank specific risks.

Following the literature, we account for credit risk, which is directly linked to asset composition (or asset quality as defined in the CAMELS framework) (Simpson and Gleason, 1999; Rahman et al., 2004; Männasoo and Mayes, 2009; Berger et al., 2012; Dam and Koetter, 2012). According to Rahman et al. (2004) and Dam and Koetter (2012), *Credit risk* is measured using the non-performing loan ratio, calculated as non-performing loans to total loans. A high ratio indicates a high probability of a bank being bailed out. Although some literature uses other measures as proxies for credit risk, we use the non-performing loan ratio, since it is more frequently used in the literature.[42]

Liquidity risk reflects the probability that banks will be unable to satisfy the claims of depositors. Similarly to Mayes and Stremmel (2012), as proxy for *Liquidity risk* we use the loan-to-deposit ratio, this is, total loans divided by total deposits. A high ratio may indicate the lack of liquidity and possible repayment problems for sudden unforeseen obligations. We expect a positive sign for the *Liquidity risk* variable.

Growth risk is measured by the market-to-book ratio, that is, the ratio of the market value to the equity book value. A higher ratio indicates a more favourable market perception and, thus, assessment of the growth options. Therefore, the likelihood of a bank being bailed out is lower.

[42] For a definition of non-performing loans see the document prepared by the Statistics Department International Monetary Fund, June 2005, available at http://www.imf.org/external/pubs/ft/bop/2005/05-29.pdf

3.3.2.4 Other specific variables of banks: size and capital

Large-scale collapses can impose substantial costs on the real economy, making a public bailout inevitable. Thus, large banks may be more likely to receive government support when confronted with financial distress. To capture the size of the bank, *Bank size* variable, we use the natural logarithm of market capitalisation.

Additionally, following the literature, we measure bank capital, *Capital* variable, by the ratio of total equity to total assets. We expect that a higher ratio makes the bank more resilient to shocks (such a sudden decline in the value of bank assets), other things being equal.

3.3.2.5 Control variables

A set of control variables that help to explain the likelihood of bailouts are also included in our model: bank-level indicators, country-specific banking sector and macroeconomic environment indicators, supervisory and regulatory environment indicators and a corruption indicator.

A. Bank-level indicators

We consider stock returns from January 2006 to December 2006 (*2006 performance*) to account for prior bank performance, institutional ownership (*Institutional ownership*) to control for ownership structure and the existence of a corporate governance committee (*CG committee*), which is represented by a dummy variable coded as one if the bank has a corporate governance committee and as zero otherwise. *Institutional ownership is* measured as the percentage of shares owned by institutional investors. Additionally, in an alternative version of our baseline model we account for the existence of a board audit committee (*Audit committee*), which is represented by a dummy variable coded as one if a separate audit committee is present in a particular bank and as zero otherwise.

B. Country-specific banking sector and macroeconomic environment indicators

Evidence shows that country-level banking sector variables are important determinants of a firm's policies, financial distress, bankruptcy and bailouts, although as regards bailouts the literature is far less abundant.

First, we include *Concentration* as a control variable. Variables such as the concentration of the banking sector are proxies that can give indications on the economic importance of the sector and the potential influence of the sector's lobby (Grossman and Woll, 2014). Economic theory provides conflicting predictions about the relationship between the concentration and the competitiveness of the banking industry and banking system fragility (Beck et al., 2006). Some theoretical arguments support the "concentration-stability" view that banking system concentration reduces fragility (Allen and Gale, 2000). Concentration enhances market power and increases profits. Higher profits provide a "buffer" against adverse shocks, decreasing the probability of bank distress. In contrast, alternative arguments support the "concentration-fragility" view that a more concentrated banking structure raises bank fragility and so, bank distress (Boyd and De Nicoló, 2005). Caminal and Matutes (2002) show that less competition can lead to less credit rationing, larger loans and a higher probability of failure if loans are subject to multiplicative uncertainty. Also, De Nicoló et al. (2004) find that the probability of failure measure for the five largest banks in a country, viewed as an indicator of systemic risk, is positive and significantly associated with bank concentration (a five-bank concentration ratio), meaning that a more concentrated banking industry is more prone to bank fragility. In the same way, Poghosyan and Čihak (2011) show that banks operating in more concentrated banking sectors are more likely to experience bank distress relative to banks operating in less concentrated markets, using as measure of concentration the Herfindahl Index. Advocates of the "concentration-fragility" view also argue that policymakers are more concerned about bank failures when there are only a few banks. Concentration may reduce competition, increase the market power and political influence of financial conglomerates and cause instability of the financial system as banks use their influence to shape banking regulations and policies. Our *Concentration* variable is a measure of concentration in the banking industry, calculated as the fraction of assets held by the

five largest banks in each country.

Second, another relevant country-level banking sector variable relates to the degree of international integration. To control for this we include as variable the ratio of consolidated foreign claims to Gross Domestic Product (GDP) of the banks that are reporting to Bank for International Settlements (BIS) (Čihák et al., 2012), which we call *IIBIS*. We can, then, evaluate whether bailed out banks were from countries where the banking system was more exposed to the international environment. Additionally, in order to control for international exposure, and as alternative to the variable *IIBIS*, we also include the foreign presence in domestic banking markets as an additional control variable (*Foreign*). Recent decades have seen an unprecedented degree of globalisation, especially in financial services. Banking markets have become increasingly international on account of financial liberalisation and overall economic and financial integration (Claessens et al., 2001). In many countries, foreign bank presence in terms of numbers has increased dramatically between 1995 and 2009 (Claessens and van Horen, 2011). Banks have expanded internationally, namely, by establishing foreign subsidiaries and branches. The global financial crisis has highlighted that there can be risks associated with cross-border banking and foreign bank presence (Claessens and van Horen, 2011). In fact, since the onset of the global financial crisis, several papers have pointed out the risks of foreign banking for financial stability. Increasingly foreign bank presence may work as a channel of international shocks transmission, increasing the vulnerability of domestic banking markets to the international environment. As stated by Donald Kohn,[43] former vice-president of the Federal Reserve, "*One result of this financial integration is that the financial channels are growing in importance in the transmission of shocks between economies. (…) when liquidity conditions tighten in one country, globally active banks may attempt to pull liquidity from overseas affiliates, reducing the liquidity consequences at home but simultaneously transmitting the shock abroad*." As a measure of foreign bank presence, we consider the importance of foreign banks in terms of numbers and not in terms of assets. On the one hand, data on banking assets that are held by foreign banks is not available for all the countries of our sample, whereas, on the other hand, the number of foreign entrants matters rather than their

[43] Speech by Donald Kohn at the International Research Forum on Monetary Policy, Frankfurt, Germany, on June 26, 2008, http://www.federalreserve.gov/newsevents/speech/kohn20080626a.htm

market share (Claessens et al., 2001). So, our measure of the degree of foreign participation in domestic banking markets, *Foreign*, which is a proxy of the level of international exposure/integration to foreign banks, is the ratio of the number of foreign owned banks to the number of the total banks in an economy. A foreign bank is defined as having at least 50% of its shares owned by foreigners.

Third, as a macroeconomic environment control variable, similarly to Faccio et al. (2006), we include GDP *per capita* to control for differences in the level of economic development across countries. More specifically, our variable *GDP per capita* is the natural logarithm of GDP *per capita*.

Data on country-level variables is taken from the World Bank website.

C. Supervisory and regulatory environment indicators

Additionally, to control for supervisory and regulatory environment we include two variables: *Official index* and *Financial freedom.*

The official supervisory powers index, *Official index*, measures the degree to which the country's commercial bank supervisory agency has the authority to take specific actions. It comprises information on many features of official supervision, including elements such as the right of the supervisor to meet with the external auditors, demand information from them and take legal action against them for negligence and force a bank to change its internal organisational structure. The official supervisory powers index has a maximum value of 14 and a minimum value of 0, where higher numbers indicate greater power. Data on official supervisory powers was obtained from the third survey of bank regulation and supervision carried out by the World Bank, available at the World Bank website, and discussed in Barth et al. (2008).

Financial freedom is an indicator of banking efficiency, as well as a measure of independence from government control and interference in the financial sector. It is a composite index covering if foreign banks are able to operate freely, the degree to which the government influences allocation of credit, how difficult it is to open domestic banks and other financial services firms, the extent to which the financial system is regulated, the presence of State-owned banks and whether banks are free to

provide insurance and securities services to customers. Thus, this aggregate financial freedom indicator, *Financial Freedom*, uses data from regulatory restrictions, entry restrictions and State ownership. Higher values indicate fewer restrictions on banking freedom and a greater openness of the banking system. On the one hand, fewer official impediments to bank operations and entry can stimulate efficiency and diversification that fosters stability. On the other hand, greater freedom and openness promotes greater international exposures which, during a crisis, can serve as a contagion channel. One source of instability in financial systems is the possibility of contagion, in which a small shock that initially affects one region or sector or even a few institutions, spreads from bank to bank throughout the rest of the system, and then affects the entire economy (Allen and Gale, 2003), as well as other economies (Eichengreen et al., 2012).

D. Corruption indicator

Finally, in order to control for differences in perceived corruption across countries, we include the variable freedom from corruption, called *Freedom corruption*. Higher values denote lower levels of corruption. Corruption deteriorates freedom by introducing insecurity and uncertainty into economic relationships and is a failure of integrity in the economic system. Freedom from corruption is expected to promote equitable treatment and greater regulatory efficiency.

There is an overlap between some of the control variables, which are used for robustness purposes. Thus, we note these overlaps and we do not include them simultaneously in the regressions.

3.3.3 Empirical framework

In the proposed empirical model the dependent variable is binary (bailed out or not bailed out), so that it would be inappropriate to use Ordinary Least Squares (OLS) regression (e.g., Maddala, 1983; Wooldridge, 2010; Greene, 2012). Thus, we estimate cross-sectional probit model regressions to determine the likelihood of bank bailouts.

Generally, since Y_i is a binomial variable, which assumes a value of 1 with probability $F(X_i'\beta)$ and a value of 0 with probability $1 - F(X_i'\beta)$, the log-likelihood function is:

$$\ln L = \sum \{Y_i \ln[F(X_i'\beta)] + (1 - Y_i)\ln[1 - F(X_i'\beta)]\} \quad (3.1)$$

where, i is the index of the i^{th} observation, X_i' is the vector of explanatory variables of observation i, β is the vector of coefficients of the explanatory variables and $F(X_i'\beta)$ is the cumulative distribution function evaluated at $X_i'\beta$.

The probit model assumes that $F(.)$ is the standard normal cumulative distribution function thus,

$$F(X_i'\beta) = \Phi(X_i'\beta) = \int_{-\infty}^{X_i'\beta} \frac{1}{\sqrt{2\pi}} e^{-0,5t^2} dt \quad (3.2)$$

More specifically, in our model the dependent variable $Bank\ bailout$ is a bailout indicator variable equal to one for banks that are bailed out at any time over the interval July 2007 to December 2009 and equal to zero otherwise. Thus,

$$Bank\ bailout_{i,[2007,2009]} = \begin{cases} 1\ if\ bank\ i\ received\ a\ bailout\ in\ [2007,2009] \\ 0\ otherwise \end{cases} \quad (3.3)$$

We assume that $Bank\ bailout^*_{i,[2007,2009]}$ is an unobserved variable of the probability that bank i received a bailout in the period between July 2007 and December 2009 and is a function of the board of the bank, bank specific risks, bank size, bank capital and a set of control variables, X_i, so that:

$$Bank\ bailout^*_{i,[2007,2009]} = \beta X'_{i,2006} + \varepsilon_{i,[2007,2009]} \quad (3.4)$$

where, i is the index of the i^{th} bank, $X'_{i,2006}$ is the vector of explanatory variables of bank i as of December 31, 2006, β is the vector of coefficients of the explanatory variables and $\varepsilon_{i,[2007,2009]}$ is the error term.

Let $Bank\ bailout_{i,[2007,2009]}$ be an observable variable that is equal to one if $Bank\ bailout^{*}_{i,[2007,2009]} > 0$ and zero if $Bank\ bailout^{*}_{i,[2007,2009]} \leq 0$. Since $Bank\ bailout^{*}_{i,[2007,2009]}$ is equal to $\beta X'_{i,2006} + \varepsilon_{i,[2007,2009]}$, the probability that $Bank\ bailout_{i,[2007,2009]} > 0$ is equal to the probability that $\beta X'_{i,2006} + \varepsilon_{i,[2007,2009]} > 0$ or, equivalently, the probability that $\varepsilon_{i,[2007,2009]} > -\beta X'_{i,2006}$. Therefore, we can write the probability that $Bank\ bailout_{i,[2007,2011]}$ is equal to one as the probability that $\varepsilon_{i,[2007,2009]} > -\beta X'_{i,2006}$ or that $Prob\big(Bank\ bailout_{i,[2007,2009]} = 1\big) = 1 - F\big(-\beta X'_{i,2006}\big) = F\big(\beta X'_{i,2006}\big)$. The probability that $Bank\ bailout_{i,[2007,2009]}$ is equal to zero is then $F\big(\beta X'_{i,2006}\big) = 1 - F\big(\beta X'_{i,2006}\big)$.

The log-likelihood function for this model is:

$$\ln L = \sum \{Bank\ bailout_{i,[2007,2009]} \ln\big[F\big(\beta X'_{i,2006}\big)\big] + \\ + \big(1 - Bank\ bailout_{i,[2007,2009]}\big)\ln\big[1 - F\big(\beta X'_{i,2006}\big)\big]\} \quad (3.5)$$

The probit model is:

$$Prob\big(Bank\ bailout_{i,[2007,2009]} = 1\big) = F\big(\beta X'_{i,2006}\big) = \int_{-\infty}^{\beta X'_{i,2006}} \frac{1}{\sqrt{2\pi}} e^{-0{,}5t^2} dt \quad (3.6)$$

Specifying Equation (3.4) then,

$$Bank\ bailout^{*}_{i,[2007,2009]} = \beta_0 + \beta_1(Board\ independence)_{i,2006} + \\ + \beta_2(Board\ size)_{i,2006} + \beta_3(CEO\ duality)_{i,2006} + \\ + \beta_4(Board\ experience)_{i,2006} + \\ + \beta_5(Director\ tenure)_{i,2006} + \\ + \beta_6(Board\ busyness)_{i,2006} + \beta_7(Credit\ risk)_{i,2006} + \\ + \beta_8(Liquidity\ risk)_{i,2006} + \beta_9(\ Growth\ risk\ )_{i,2006} + \\ + \beta_{10}(Bank\ size)_{i,2006} + \beta_{11}(Capital)_{i,2006} + \\ + \beta_{12}(Control\ variables)_{i,2006} + \varepsilon_{i,[2007,2009]} \quad (3.7)$$

For a detailed definition of the variables please see sub-section 3.3.2 and Appendix 3.1.

When a binary model incorrectly assumes that error variances are the same for all observations (homocedasticity), the classical standard errors are wrong and (unlike OLS regression) the parameter estimates are inconsistent. Since, heteroscedasticity causes parameter estimates from probit (and logit) model to be inconsistent, it is a serious problem (Davidson and MacKinnon, 1984) that has to be taken into account. Thus, we examine the heteroscedasticity using the Lagrange Multiplier (LM) test.[44] Also, we estimate the model with robust variances-covariances.[45]

3.4 Empirical results

In this section we first present and analyse the descriptive statistics, the univariate tests of differences between bailed out and not bailed out banks and the Pearson correlation matrix. Then, we present and discuss the estimation results of the probit regressions and, finally, the predictive performance of the model.

3.4.1 Descriptive statistics and correlation matrix

Table 3.1 presents the descriptive statistics for the independent variables used in our analysis.

[44] We carry out the LM test for heteroscedasticity using the artificial regression method described in detail by Davidson and MacKinnon (1993). We test the null hypothesis of homoscedasticity against the alternative of heteroscedasticity of the form: $Var(\varepsilon_i) = exp(2Z_i'\gamma)$, where γ is an unknown parameter.
[45] So, the standard errors are robust to certain misspecification of the underlying distribution of the binary dependent variable.

Table 3.1 – Descriptive statistics

The table reports the descriptive statistics of each variable by showing mean, median, standard deviation (Std. dev.), maximum (Max.) and minimum (Min.).

Variable	# Obs.	Mean	Median	Std. dev.	Max.	Min.
Board independence (%)	72	41.449	44.097	28.729	95.454	0.000
Board size (Nº)	72	16.389	15.000	5.700	31.000	6.000
CEO duality	72	0.069	0.000	0.256	1.000	0.000
Board experience (years)	72	12.751	10.778	6.509	35.064	3.000
Director tenure (years)	72	5.286	4.900	1.741	11.700	1.100
Board busyness (Nº)	72	2.631	2.375	1.011	5.750	1.100
Credit risk (%)	57	2.127	1.080	3.993	28.920	0.080
Liquidity risk (%)	68	177.439	157.400	148.217	1186.760	46.320
Growth risk (%)	72	238.588	209.703	108.612	692.477	47.080
Bank size (€ bil.)	72	22.727	11.410	29.588	160.442	0.220
Capital (%)	72	5.480	5.244	2.705	14.672	1.792
2006 performance (%)	72	25.072	20.836	19.611	93.981	-29.251
Institutional ownership (%)	69	44.464	44.320	27.001	100.000	0.030
CG committee	68	0.176	0.000	0.384	1.000	0.000
Audit committee	69	0.812	1.000	0.394	1.000	0.000
Concentration (%)	72	80.348	82.283	15.275	100.000	49.460
IIBIS (%)	72	102.401	73.553	57.191	307.321	58.280
Foreign (%)	72	22.847	13.000	22.324	90.000	1.000
GDP *per capita* (US$)	72	38,304.91	36,472.07	10,794.59	72,959.73	19,820.43
Official index	72	9.306	8.000	2.499	14.000	5.000
Financial freedom	72	65.000	70.000	15.291	90.000	50.000
Freedom corruption	72	73.139	75.000	16.733	97.000	43.000

Note: Observations vary because of missing data.

Please refer to Appendix 3.1 for the definition of each variable.

As can be noted from Table 3.1, on average, 41.449% of the directors on the board are independent. The board has, on average, 16.389 directors, confirming the existing literature that banks have on average larger boards than non-financial firms, and a very small proportion of banks (6.9%) have a dual CEO corporate governance structure. Concerning board experience, director tenure and board busyness we find that, on average, supervisory directors have 12.751 years of experience in the banking sector, have served on the board 5.286 years and held 2.631 board positions. One aspect

relating to bank specific risks that stands out is, with the exception of the credit risk, the high dispersion. Bank size is, on average € 22.727 billion[46] and the capital ratio is, on average, 5.48%, which is a low value comparatively to the limits of the different components of capital imposed in the Basel III framework.[47]

Regarding bank-level control variables, the stock returns before the financial crisis (2006) are, on average 25.072%, a positive value, although the minimum value is negative (-29.251%) and institutional investors own, on average, 44.464% bank shares. Also, 17.6% of banks have a corporate governance committee, while about 81.2% have an audit committee. So, in our sample of banks the existence of an audit committee is more common than a corporate governance committee.

With respect to country-specific control variables, we note that the percentage of assets held by the five largest banks is, on average, 80.348%, a higher percentage relatively to other studies (e.g., De Nicoló et al. (2004) report a mean five-firm concentration ratio of 57% in 1995, which increased slightly to 60% in 2000). The ratio of consolidated foreign claims to GDP of the banks that are reporting to BIS is, on average, 102.401% and the percentage of foreign banks among total banks is, on average, 22.847%.

The GDP *per capita* ranges from a high of US$72,959.73 to a low of US$19,820.43 and the mean is U$38,304.91.[48]

Furthermore, in our sample, the official supervisory index ranges from a minimum of 5 to a maximum of 14, which is also the highest value of the index, and the mean is 9.306. Financial freedom ranges from a minimum of 50 to a maximum of 90, where the highest value of the index is 100, and a mean is 65. Finally, freedom from corruption ranges from a minimum of 43 to a maximum of 97, where the highest value of the index is 100, and the mean is 73.139.

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[46] Due to the quite positively skewed distribution of the *Bank size* we use the natural logarithm, *ln(Bank Size)*, in the regression analysis.

[47] In the Basel III framework, 1) Common Equity Tier 1 must be at least 4.5% of risk-weighted assets at all times, 2) Tier 1 Capital must be at least 6.0% of risk-weighted assets at all times, 3) Total Capital (Tier 1 Capital plus Tier 2 Capital) must be at least 8.0% of risk-weighted assets at all times and 4) a minimum Tier 1 leverage ratio of 3% during the parallel run period from 1 January 2013 to 1 January 2017. Although these risk-weighted capital ratios measures are used in some previous studies, they face a clear drawback (Mayes and Stremmel, 2012). "*They are open to manipulation and provide space for discretion to cover up the real condition of the bank*" (Mayes and Stremmel, 2012, p. 12). Accordingly, we use a non-risk-weighted capital measure.

[48] Although we use the natural logarithm of *GDP per capita* in the regression analysis, *ln(GDP per capita)*, in Table 3.1 the *GDP per capita* is reported.

To obtain a first impression on potential differences between bailed out and not bailed out banks we compare our main variables, underlying to our hypotheses, between these two groups of banks. Descriptive statistics and the univariate tests of differences between bailed out and not bailed out banks are reported in Table 3.2. The univariate tests are the t-test and the non-parametric Wilcoxon/Mann-Whitney test for the continuous variables and the Chi-squared test for the categorical variable.

Table 3.2 – Comparison between bailed out and not bailed out banks

The table reports a comparison of the main variables used in the paper's multivariate analysis between bailed out and not bailed out banks. Descriptive statistics and the univariate tests of differences between the two groups of banks are presented.

Variable	# Obs.	Mean	Median	Std. dev.	Max.	Min.	t-test [a)]	Wilcoxon test/Chi-squared test [a)]
Board independence								
Bailed out	32	41.971	46.875	31.316	94.736	0.000	-0.137	0.380
Not bailed out	40	41.032	43.651	26.882	95.455	0.000		
Board size								
Bailed out	32	17.875	16.000	5.890	31.000	10.000	-2.021**	1.745*
Not bailed out	40	15.200	15.000	5.321	29.000	6.000		
CEO duality								
Bailed out	32	0.098	0.000	0.296	1.000	0.000	---	0.527
Not bailed out	40	0.050	0.000	0.221	1.000	0.000		
Board experience								
Bailed out	32	12.722	10.060	7.783	35.064	3.751	0.033	0.799
Not bailed out	40	12.773	11.298	5.384	26.613	3.000		
Director tenure								
Bailed out	32	5.053	4.900	1.741	8.100	1.700	0.859	0.544
Not bailed out	40	5.473	4.900	2.278	11.700	1.100		

Table 3.2 – Comparison between bailed out and not bailed out banks *(cont.)*

The table reports a comparison of the main variables used in the paper's multivariate analysis between bailed out and not bailed out banks. Descriptive statistics and the univariate tests of differences between the two groups of banks are presented.

Variable	# Obs.	Mean	Median	Std. dev.	Max.	Min.	t-test [a)]	Wilcoxon test/Chi-squared test [a)]
Board busyness								
Bailed out	32	2.840	2.575	1.153	5.750	1.100	-1.588	1.303
Not bailed out	40	2.463	2.325	0.860	5.250	1.450		
Credit risk								
Bailed out	26	3.237	1.350	5.696	28.920	0.280	-1.970*	1.210
Not bailed out	31	1.197	0.890	0.870	3.420	0.080		
Liquidity risk								
Bailed out	32	186.242	154.680	189.402	656.560	64.220	-0.459	0.197
Not bailed out	36	169.614	157.400	100.730	1186.760	46.320		
Growth risk								
Bailed out	32	230.937	203.066	89.938	422.249	132.475	0.532	0.504
Not bailed out	40	244.708	223.497	122.315	692.477	47.080		
Bank size								
Bailed out	32	16.518	16.621	1.072	18.390	14.225	-2.221**	2.000**
Not bailed out	40	15.760	15.837	1.674	18.893	12.305		

Table 3.2 – Comparison between bailed out and not bailed out banks *(cont.)*

The table reports a comparison of the main variables used in the paper's multivariate analysis between bailed out and not bailed out banks. Descriptive statistics and the univariate tests of differences between the two groups of banks are presented.

Variable	# Obs.	Mean	Median	Std. dev.	Max.	Min.	t-test [a)]	Wilcoxon test/Chi-squared test [a)]
Capital								
Bailed out	32	4.653	4.416	1.877	10.317	2.076	2.399**	2.306**
Not bailed out	40	6.143	5.528	3.083	14.672	1.792		

Note: Observations vary because of missing data.

Asterisks indicate significance at the 1% (***), 5% (**) and 10% (*) levels, using a two-tailed test. Please refer to Appendix 3.1 for the definition of each variable.

[a)] t-test and the non-parametric Wilcoxon/Mann-Whitney test for the continuous variables and the Chi-squared test for the categorical variable (CEO duality).

Table 3.2 reports the descriptive statistics categorised for banks that received bailouts between 2007 and 2009 and for banks that did not. Also, Table 3.2 reports the results of the t-test, non-parametric Wilcoxon/Mann-Whitney test and Chi-squared test of the null hypothesis that there is no difference between the two subsamples of banks.

Comparing the results for bailed out and not bailed out banks, and according to the mean difference test (t-test), we find that bailed out banks have a larger board, higher credit risk, larger size and less capital. The results remain unchanged, with the exception of credit risk, according to the median difference tests (Wilcoxon/Mann-Whitney test and Chi-squared test). Since in a univariate setting we do not control for various factors that may influence the likelihood of a bank being bailed out, we will forego a detailed analysis of the univariate statistics and instead rely on the multivariate regression results to interpret the influence of the variables on bank bailouts in greater detail.

Table 3.3 presents the Pearson correlation matrix for the independent variables. Due to the problem of space, given the number of variables, we present the correlation matrix in three different panels. Panel A presents the correlation between the main variables themselves, Panel B presents the correlation between the main variables and the control variables and Panel C presents the correlation between the control variables themselves.

Table 3.3 – **Pearson correlation matrix**

Panel A:

	Variables	1	2	3	4	5	6	7	8	9	10	11
1	Board independence	1.000										
2	Board size	-0.141	1.000									
3	CEO duality	0.021	-0.084	1.000								
4	Board experience	-0.153	0.223	-0.057	1.000							
5	Director tenure	0.091	0.046	0.099	0.193	1.000						
6	Board busyness	-0.142	0.376***	-0.034	0.434***	0.135	1.000					
7	Credit risk	-0.011	0.068	0.290**	-0.015	-0.154	-0.221	1.000				
8	Liquidity risk	-0.017	-0.020	-0.165	0.018	0.280	0.141	-0.263	1.000			
9	Growth risk	0.066	-0.288**	0.077	-0.037	0.130	-0.217	-0.057	-0.100	1.000		
10	Bank size	0.442***	0.240*	0.097	0.065	-0.056	0.136	-0.037	0.453***	0.219	1.000	
11	Capital	-0176	-0.193	0.153	0.050	0.029	-0.065	0.070	-0.183	-0.025	-0.376***	1.000

Asterisks indicate significance at the 1% (***), 5% (**) and 10% (*), using a two-tailed test. Please refer to Appendix 3.1 for the definition of each variable.

Table 3.3 – Pearson correlation matrix *(cont.)*

Panel B:

	Variables	1	2	3	4	5	6	7	8	9	10	11
12	2006 performance	-0.192	0.038	-0.161	0.415***	0.030	0.185	0.074	-0.107	0.351***	-0.084	-0.083
13	Institutional ownership	-0.009	0.094	-0.325**	0.269*	0.125	0.237*	-0.104	0.043	-0.064	-0.163	-0.139
14	CG committee	0.248	-0.050	0.061	0.086	0.276	0.009	-0.020	-0.031	0.168	0.125	-0.088
15	Audit committee	-0.032	-0.053	-0.030	0.024	0.011	-0.109	-0.300**	-0.205	0.307**	0.191	-0.306**
16	Concentration	-0.191	-0.083	-0.106	0.099	0.075	0.083	-0.373***	-0.176	0.104	-0.045	-0.256*
17	IIBIS	0.157	-0.179	-0.154	-0.091	0.015	-0.078	-0.173	-0.188	-0.011	0.081	0.059
18	Foreign	0.124	-0.016	-0.085	-0.123	0.002	-0.104	0.007	-0.203	0.040	0.166	0.011
19	GDP *per capita*	0.051	-0.323**	-0.193	-0.303**	-0.295**	-0.076	-0.279**	-0.168	-0.240*	0.046	-0.061
20	Official index	-0.147	-0.073	-0.035	0.277**	0.099	-0.048	-0.114	-0.161	0.269*	-0.135	0.108
21	Financial freedom	0.295**	-0.387***	-0.181	-0.174	0.084	-0.221	-0.427***	-0.041	0.124	0.202	-0.131
22	Freedom corruption	-0.004	-0.209	-0.239*	-0.029	-0.085	0.026	-0.534***	0.049	-0.038	0.133	-0.328**

Asterisks indicate significance at the 1% (***), 5% (**) and 10% (*), using a two-tailed test. Please refer to Appendix 3.1 for the definition of each variable.

Table 3.3 – Pearson correlation matrix *(cont.)*

Panel C:

	Variables	12	13	14	15	16	17	18	19	20	21	22
12	2006 performance	1.000										
13	Institutional ownership	0.184	1.000									
14	CG committee	-0.012	-0.136	1.000								
15	Audit committee	-0.042	0.035	0.108	1.000							
16	Concentration	0.011	0.066	0.151	0.742***	1.000						
17	IIBIS	-0.203	0.023	0.281**	0.354***	0.261*	1.000					
18	Foreign	-0.277**	0.099	0.281**	0.337**	0.124	0.878***	1.000				
19	GDP *per capita*	-0.183	-0.034	-0.214	0.149	0.241*	0.402***	0.092	1.000			
20	Official index	0.108	-0.126	0.346**	0.416***	0.455***	0.453***	0.304**	-0.105	1.000		
21	Financial freedom	-0.147	0.100	0.037	0.498***	0.287**	0.623***	0.518***	0.483***	0.125	1.000	
22	Freedom corruption	-0.007	0.162	-0.052	0.613***	0.660***	0.368***	0.141	0.702***	0.144	0.684***	1.000

Asterisks indicate significance at the 1% (***), 5% (**) and 10% (*), using a two-tailed test. Please refer to Appendix 3.1 for the definition of each variable.

Multicollinearity does not appear to be a problem in our model. The correlation coefficients among all independent variables included in each regression analysis are less, in absolute value, than 0.8,[49] that is the threshold beyond which multicollinearity problems arise (e.g., Gujarati, 2004). In addition, to double check for any multicollinearity issue we also compute the Variance Inflation Factor (VIF) for each independent variable. All the VIF values (unreported but available upon request) are below the critical value of 10 (e.g., Gujarati, 2004; Asteriou and Hall, 2011; Chatterjee and Hadi, 2012), which indicate that multicollinearity is not a major problem in the regression analyses. We note that, since multicollinearity is mainly an issue involving independent variables in a regression rather than the dependent variable or the link function between the independent and the dependent variables, the use of available linear regression methods is usually applicable in nonlinear regression settings. As Menard (2002, p. 76) points up "*because the concern is with the relationship among the independent variables, the functional form of the model for the dependent variable is irrelevant to the estimation of collinearity*."

3.4.2 Estimation results on the determinants of bailouts

In this sub-section we present and analyse the results of the probit regressions which test the relationship between the dependent variable *Bank bailouts* and a set of corporate governance variables, bank specific risks, bank capital, bank size and control variables. Our goal is to analyse the determinants of the likelihood of bailouts in the European banking sector in the context of the global financial crisis.

Table 3.4, in Column (1), reports the results of the probit regressions for the baseline model. In Columns (2) to (4) we test the robustness of our findings.

Table 3.5 reports the results of the baseline model augmented by additional control variables.

[49] The Pearson correlation between the variables *IIBIS* and *Foreign* is higher than 0.8 (specifically 0.878) but, first of all for theoretical reasons, they are not included simultaneously in the regression.

Table 3.4 – Determinants of bailouts

The table presents the results of the probit regressions used to predict the probability of bailouts in the European banking sector in the context of the financial crisis.

Variable	**(1)**	**(2)**	**(3)**	**(4)**
	Baseline Model			
Board independence	0.021*	0.022**	0.026**	0.007
	(0.055)	(0.044)	(0.019)	(0.448)
Board size	0.034	0.035	0.038	0.049
	(0.552)	(0.542)	(0.476)	(0.308)
CEO duality	-0.139	2.845**	-0.092	1.414
	(0.883)	(0.013)	(0.919)	(0.150)
Board independence × CEO duality	---	-0.049**	---	---
		(0.032)		
Board experience	-0.190***	-0.185***	-0.144**	-0.173***
	(0.002)	(0.002)	(0.016)	(0.004)
Director tenure	-0.594***	-0.617***	-0.544**	-0.527**
	(0.010)	(0.007)	(0.020)	(0.011)
Board busyness	1.328***	1.285***	1.296**	0.955**
	(0.005)	(0.004)	(0.011)	(0.017)
Credit risk	1.083***	1.080***	1.050***	1.125***
	(0.000)	(0.000)	(0.000)	(0.004)
Liquidity risk	0.010**	0.010***	0.011***	-0.067**
	(0.013)	(0.009)	(0.007)	(0.015)
Growth risk	-0.001	0.002	0.001	-0.002
	(0.969)	(0.957)	(0.970)	(0.792)

Table 3.4 – Determinants of bailouts *(cont.)*

The table presents the results of the probit regressions used to predict the probability of bailouts in the European banking sector in the context of the financial crisis.

Variable	**(1)**	**(2)**	**(3)**	**(4)**
	Baseline Model			
Bank size	0.210	0.203	0.018	0.118
	(0.497)	(0.504)	(0.952)	(0.723)
Capital	-0.233	-0.222	-0.249	-0.041
	(0.149)	(0.168)	(0.134)	(0.765)
2006 performance	0.043**	0.042*	0.053**	0.043**
	(0.050)	(0.055)	(0.035)	(0.045)
Institutional ownership	-0.006	-0.006	-0.017	-0.005
	(0.529)	(0.510)	(0.172)	(0.623)
CG committee	-2.266***	-2.215***	-1.955**	-1.645*
	(0.007)	(0.006)	(0.023)	(0.051)
Concentration	0.083***	0.086***	0.044***	0.045**
	(0.002)	(0.001)	(0.004)	(0.025)
IIBIS	0.029***	0.029***	---	0.026***
	(0.000)	(0.000)		(0.001)
Foreign	---	---	0.062***	---
			(0.002)	
GDP *per capita*	-3.513**	-3.599**	-1.688	-3.176**
	(0.016)	(0.013)	(0.155)	(0.027)
N	53	53	53	53
Bailed out	23	23	23	23

Table 3.4 – Determinants of bailouts *(cont.)*

The table presents the results of the probit regressions used to predict the probability of bailouts in the European banking sector in the context of the financial crisis.

Variable	**(1)**	**(2)**	**(3)**	**(4)**
	Baseline Model			
Not bailed out	30	30	30	30
% correct	83.02	83.02	81.13	75.47
LR statistics	35.801	36.418	34.236	29.924
	(0.005)	(0.006)	(0.008)	(0.027)
Pseudo R^2	0.493	0.502	0.472	0.412

The p-values of coefficient significance are in brackets and asterisks indicate significance at the 1% (***), 5% (**) and 10% (*) levels, using a two-tailed test. Please refer to Appendix 3.1 for the definition of each variable.

3.4.2.1 The baseline model

The baseline estimation results, Column (1) in Table 3.4, show that the coefficient on the *Board independence* variable is positive and statistically significant and thus, board independence positively influence the likelihood of a bailout. This confirms hypothesis H_1 and is consistent with previous studies in the context of the financial crisis (Adams, 2012) and related to corporate failure (Hsu and Wu, 2014). Our result suggests that independent directors suffer from bank-specific knowledge, which penalises the effectiveness of the board and thus, increases the likelihood of a bank participating in a bailout programme.

The coefficient on the *Board size* variable, on the contrary, is not statistically significant, indicating no association between the board size and the probability of bailouts of our sample banks. This finding is consistent with Elloumi and Gueyié (2001), Lajili and Zéghal (2010) and Darrat et al. (2014) respectively on financial distress and bankrupt firms, but contradicts Adams (2012) who finds that banks that received funds from TARP in the US have larger board. In a sample of European banks we do not find evidence that larger boards of banks are detrimental and, thereby, increase the probability of participating in a bailout programme. Our hypothesis H_2 is not confirmed.

The lack of statistical significance regarding the *CEO duality* variable indicates that separating the positions of CEO and Chairman has no impact on the likelihood of a bank being bailed out. Therefore, we do not find support for the hypothesis H_3. This finding is consistent with previous financial distress studies (Elloumi and Gueyié, 2001; Abdullah, 2006; Miglani et al., 2015), bankruptcy studies (Lajili and Zéghal, 2010) and the study by Carty and Weiss (2012) which, using a sample of US publicly traded banks, shows that banks with a dual CEO structure are not more likely to participate in bailout programmes. Thus, results in the European context are in accordance with results in the US context.

On the contrary, Column (1) in Table 3.4 reveals that banking experience matters and so, we find support for hypothesis H_4. The coefficient on the *Board experience* variable is negative and statistically significant, indicating that banking experience providing a deep and sound knowledge of the complexity, dynamics and specificities of

the banking activity, as well as a better comprehension of its opaqueness and regulatory environment, make it less likely for a bank to be bailed out as found by Fernandes and Fich (2013). Thus, banking experience of the board's supervisory directors enables banks to be safer from government assistance. Similarly, the coefficient on the *Director tenure* variable is negative and statistically significant at the 1% level, confirming hypothesis H_5. As expected, banks with shorter supervisory directors' tenure are more likely to need State aid. Thus, a bank is better served by longer-standing supervisory directors', who have more bank specific knowledge and are better able to monitor and advise bank managers. This finding is also found, for example, by Lajili and Zéghal (2010). The positive and statistically significant coefficient on the *Board busyness* variable indicates that busier supervisory directors increase the probability of a bank participating in a bailout programme, confirming hypothesis H_6. This result provides support for the *Busyness Hypothesis* and the view that the presence of supervisory directors holding too many directorships compromises board effectiveness.

With respect to bank specific risks, the coefficients on the *Credit risk* and *Liquidity risk* variables are positive and statistically significant, while the coefficient on the *Growth risk* variable is not statistically significant. Thus, the credit and liquidity risks increase the likelihood of a bank being bailed out while the growth risk has no impact. These results confirm hypotheses $H_{7.1}$ and $H_{7.2}$ but not hypothesis $H_{7.3}$. Consistent with the general view, (e.g., Dam and Koetter, 2012), the decline in the quality of banks' loan portfolios, resulting in an increasing proportion of non-performing loans, is associated with a higher probability of being bailed out. The larger the proportion of non-performing loans, the more likely a bank will participate in a bailout plan. Also, as expected, we find a positive sign for the liquidity risk measure in predicting bailouts. So, as the loan-to-deposit ratio increases the likelihood of a bank being bailed out increases. This finding is in accordance with the existence of benefits associated with liquidity.

Furthermore, in our sample of cross-country European banks the coefficient on the *Bank size* variable is not statistically significant, which does not confirm hypothesis H_8. So, our findings do not support the view that individual bank size creates a moral hazard problem resulting from the fact that, as banks grow they increase their importance and so the probability of being saved. The issue of "too-big-to-fail" is not

validated at bank-level but is validated at country-level given that the coefficient on the *Concentration* variable is positive and statistically significant. *Concentration* variable is used as proxy for the importance of the banking sector and its potential influence on banking regulations and policies. Size of individual banks does not seem to matter, but size (and importance) of the banking sector in a country increases the probability of receiving bailouts from government. In contrast to our expectation, the coefficient on the *Capital* variable is not statistically significant. Thus, the capital of banks, in our sample, has no impact on the likelihood of bailouts and hypothesis H_9 is not confirmed.

Concerning bank-level control variables, the coefficient on the *2006 performance* variable is positive and statistically significant and the coefficient on the *CG committee* variable is negative and statistically significant. Our results show that performance before the crisis increases the likelihood of bailouts. So, the better-performing banks before the crisis are the most likely to be bailed out following the crisis. Also, banks with a corporate governance committee are less likely to participate in a bailout programme. On the contrary, the coefficient on the *Institutional ownership* variable is not statistically significant and thus, institutional investors do not influence the likelihood of bailouts.

Moreover, we find that country-level variables explain the probability of individual banks being bailed out. The coefficients on *Concentration* and *IIBIS* variables are both positive and statistically significant. In line with the "concentration-fragility" view, (e.g., De Nicoló et al., 2004; Poghosyan and Čihak, 2011), we find that banks located in more concentrated banking sectors are more likely to be bailed out. Furthermore, we provide empirical evidence suggesting the importance of the degree of international integration. Increasing the international exposure of a country's banking system increases the probability of a bank of that country participating in a bailout programme. Finally, the coefficient on the *GDP per capita* is negative and significant, indicating that banks are more likely to be bailed out in poorer countries.

3.4.2.2 Robustness checks

To assess the reliability of the baseline results, we employ a set of robustness checks, Table 3.4, Columns (2) to (4).

While we do not formally hypothesise interactive effects, we now extend our research by explicitly modelling a corporate governance interaction term. The underlying idea is that, in addition to the effect of various governance variables (taken individually) on the likelihood of bailouts, the interaction effect among these variables can help to predict bailouts. Encouraged by previous studies in the context of corporate bankruptcy (Daily and Dalton, 1994a, 1994b) we test the interaction between board independence and CEO duality. This interaction variable is the unweighted multiplication of a bank's proportion of independent directors and dual CEO corporate governance structure. Column (2) presents the results when the interaction term among the corporate governance variables is included. Interestingly, although board independence and CEO duality (taken individually) have a positive impact on the likelihood of bailouts, the two-way interaction between board independence and CEO duality has a negative impact. Our findings do not confirm those of Daily and Dalton (1994a, 1994b), who find a positive relationship in the context of bankrupt firms. The introduction of the interaction term leaves the results unchanged, with the exception of CEO duality that gains statistical significance.

In column (3) we replace the *IIBIS* variable in the baseline model with the *Foreign* variable, which is the fraction of the number of foreign owned banks to the number of the total banks in the country. As result of increasing financial integration, foreign banks have become important in domestic financial intermediation (Claessens and van Horen, 2011). As there is a potential overlap between both variables we do not include them simultaneously in the regressions below. Similarly to the coefficient on the *IIBIS* variable, the coefficient on the *Foreign* variable is significantly positive. Additionally, our qualitative findings with respect to the main explanatory variables remain unchanged and with regard to the control variables the differences are negligible, supporting the robustness of our results.

In Column (4) we investigate the sensitivity of the results of our baseline model using a different definition of specific risks, bank size and concentration. Specifically,

we measure: 1) credit risk as the ratio of non-performing assets to total assets, 2) liquidity risk as the ratio of total deposits to total assets, 3) growth risk as the percentage of assets growth in the year immediately prior to the financial crisis, 4) bank size as the natural logarithm of assets and 5) concentration in the banking industry as the fraction of assets held by the three largest banks in each country. Estimation results are very similar to the baseline model thus, suggesting that our results are scarcely affected by the use of alternative variables. We note that only the coefficient on the *Board independence* variable loses statistical significance.

In unreported regression we replicate the estimation in Columns (2) and (4) using *Foreign* variable instead of the *IIBIS* variable and we arrive at similar conclusions.

3.4.2.3 Introducing additional control variables

As a new step we augmented the baseline model by introducing additional bank-level and country-level control variables. First, we want to confirm that our main conclusions hold when additional control variables are accounted for. Second, we intend to test whether the existence of a board audit committee, the supervision and the regulation in the banking sector affect the likelihood of a bank being bailed out. Controlling for differences in national policies provides not only a simple robustness test but it is also independently valuable as countries implement regulations to promote stability.

Table 3.5 presents the results.

Table 3.5 – Determinants of bailouts with additional control variables

The table presents the results of the probit regressions used to predict the probability of bailouts in the European banking sector in the context of the financial crisis, including additional control variables.

Variable	(1)	(2)	(3)	(4)
Board independence	0.021*	0.026**	0.014	0.024*
	(0.099)	(0.040)	(0.130)	(0.062)
Board size	0.053	0.025	0.089	0.047
	(0.358)	(0.679)	(0.126)	(0.496)
CEO duality	0.400	-0.496	-0.355	-0.334
	(0.711)	(0.609)	(0.728)	(0.727)
Board experience	-0.202***	-0.291***	-0.114**	-0.196***
	(0.001)	(0.000)	(0.016)	(0.001)
Director tenure	-0.639***	-0.703***	-0.450***	-0.609***
	(0.006)	(0.001)	(0.002)	(0.005)
Board busyness	1.252***	1.692***	1.079**	1.390***
	(0.009)	(0.000)	(0.000)	(0.002)
Credit risk	1.127***	1.320***	1.053***	1.256***
	(0.001)	(0.000)	(0.000)	(0.001)
Liquidity risk	0.010**	0.012**	0.005	0.011**
	(0.019)	(0.020)	(0.122)	(0.030)
Growth risk	0.004	-0.004	0.003	0.001
	(0.380)	(0.381)	(0.363)	(0.910)
Bank size	0.243	0.541	-0.046	0.154
	(0.445)	(0.149)	(0.860)	(0.654)

Table 3.5 – Determinants of bailouts with additional control variables *(cont.)*

The table presents the results of the probit regressions used to predict the probability of bailouts in the European banking sector in the context of the financial crisis, including additional control variables.

Variable	**(1)**	**(2)**	**(3)**	**(4)**
Capital	-0.296*	-0.248	-0.031	-0.213
	(0.089)	(0.170)	(0.800)	(0.177)
2006 performance	0.031	0.055	0.016	0.041*
	(0.194)	(0.170)	(0.426)	(0.065)
Institutional ownership	0.001	8.99E-05	-0.008	-0.011
	(0.928)	(0.993)	(0.500)	(0.394)
CG committee	-2.861***	-3.322**	-0.289	-2.270***
	(0.001)	(0.002)	(0.694)	(0.009)
Audit committee	-2.055**	---	---	---
	(0.037)			
Concentration	0.115***	0.098***	0.064***	0.076***
	(0.000)	(0.000)	(0.007)	(0.008)
IIBIS	0.036***	0.029***	---	0.029***
	(0.000)	(0.001)		(0.000)
GDP *per capita*	-3.768***	-4.182***	-4.755*	-4.372**
	(0.008)	(0.003)	(0.099)	(0.003)
Official index	---	0.244	---	---
		(0.221)		
Financial freedom	---	---	0.059***	---
			(0.010)	

Table 3.5 – Determinants of bailouts with additional control variables *(cont.)*

The table presents the results of the probit regressions used to predict the probability of bailouts in the European banking sector in the context of the financial crisis, including additional control variables.

Variable	**(1)**	**(2)**	**(3)**	**(4)**
Freedom corruption	---	---	---	0.030
				(0.459)
N	53	53	53	53
Bailed out	23	23	23	23
Not bailed out	30	30	30	30
% correct	84.91	84.91	77.36	83.02
LR statistics	37.907	37.327	28.906	36.213
	(0.004)	(0.005)	(0.035)	(0.007)
Pseudo R^2	0.523	0.515	0.398	0.499

The p-values of coefficient significance are in brackets and asterisks indicate significance at the 1% (***), 5% (**) and 10% (*) levels, using a two-tailed test. Please refer to Appendix 3.1 for the definition of each variable.

In Table 3.5, Column (1), to account for the impact of the existence of a separate audit committee, we also include the *Audit committee* variable, which is a dummy variable with a value of one if the bank has an audit committee and zero otherwise. We conclude that, similarly to Miglani et al. (2015), the coefficient on the *Audit committee* variable is negative and statistically significant. The existence of an audit committee, as well as the existence of a corporate governance committee, decreases the likelihood of bailouts. This finding is consistent with the argument of Forker (1992) that the presence of an audit committee enhances board monitoring quality and attenuates agency costs. We note that the coefficient on the *Capital* variable is, now, negative and statistically significant.

Next we account for differences in bank supervision and regulation. In Column (2), we add to our baseline model the official supervisory powers index, *Official index* variable, which is an index of the power of the country's commercial bank supervisory agency. We find that the coefficient on the *Official index* variable is not statistically significant and that our results are robust to the introduction of this additional control variable.

Further, alternatively, in Column (3), we include the variable *Financial freedom*, which is an indicator of the general openness and regulatory framework as it contains elements like openness to foreign competition and the extent of government regulation of financial services. Also, we note the potential overlap between the *IIBIS* and the *Financial freedom* variables, yet we do not include them at the same time. The results are not very different from the baseline model. Regarding our main variables, the coefficients on the *Board independence* and *Liquidity risk* variables are now not statistically significant. Also, we find that the coefficient on the *Financial freedom* variable is positive and statistically significant, indicating that fewer restrictions on banking freedom and greater openness increase the likelihood of bailouts. Thus, our results suggest detrimental effects of financial freedom. Banks are able to operate more freely and to engage in different and risky activities, far beyond their core activities. Also, the data points to the presence of contagion effects.

Lastly, in Column (4), we check the extent to which our results might be driven by corruption differences in countries. The estimation results corroborate our findings for the baseline specification. Also, the coefficient on the *Freedom corruption* variable

is not significant at the conventional levels. Thus, as Faccio et al. (2006), the level of corruption is not statistically significant in explaining the likelihood of a bailout.

3.4.3 Predictive performance of the model

An important property of the probit and logit models is its precision in terms of minimising Type I and Type II errors (Persons, 1999). "*The evaluation of the predictive ability requires knowledge of the models' Type I and Type II error rates*" (Persons, 1999, p. 140). A Type I error occurs when the model fails to identify the bailed out bank. So, a bailed out bank is incorrectly classified as not bailed out. In other words, Type I error rate is the probability of misclassifying a bailed out bank as not bailed out. On the other hand, a Type II error occurs when a not bailed out bank is falsely identified as bailed out. Thus, Type II error rate is the probability of misclassifying a not bailed out bank as bailed out. To attribute a particular bank into one of the two categories (bailed out versus not bailed out), we need to set up a cutoff point in terms of the probability of bailout. All banks above that cutoff point are blacklisted as bailed out banks, while all banks below that point are classified as not bailed out.

A higher cutoff point leads to a lower number of banks on the blacklist of bailed out banks, which tends to increase the Type I error. Setting a lower cutoff point can reduce the Type I error, but at the expense of a higher Type II error. In our previous analysis the percentage of correct classification reported in Tables 3.4 and 3.5 is obtained using 50% as the cutoff point, which is the most often used cutoff point. The optimal cutoff point depends on the relative weights that an analyst puts on Type I and Type II errors. However, from a prudential perspective, it is reasonable to put a larger weight on the Type I error, because supervisors, regulators and governments are mainly concerned with avoiding bailouts. This implies a preference for relatively low cutoff points, which limit the Type I errors at the expense of more Type II error. To address the trade-off between Type I and Type II errors, we illustrate the sensitivity of Type I and Type II errors with respect to the choice of the cutoff point.

Table 3.6 displays the relationship between model predictions and actual bailout events for our baseline specification using three different cutoff points (50%, 10%, and

5%). The table shows that the model correctly classifies 18 of 23 bailout events (78.26%) and 26 of 30 non-bailouts events (86.67%) for the 50%. cutoff point. The model failed to correctly classify 5 of 23 bailout events, 21.74% (Type I error) and wrongly classified 4 of 30 (13.33%) not bailed banks as bailed out (Type II error).

Lowering the cutoff point to 10% results in a decrease in the Type I error rate, which is now 4.35%. However, this coincides with a substantial increase in the Type II error rate, which is now 53.33%. So, the ability to predict bailouts increases, although the ability to predict non bailouts decreases.

Finally, decreasing the cutoff point further to 5% results in an even larger increase in the Type II error rate, 60%, while leaving the Type I error rate unchanged.

Table 3.6 – Relationship between model predictions and actual bailouts events using different cutoff points

The table presents the comparison between model predictions and actual bailouts for the baseline model using as cutoff 50%, 10%, and 5%.

		Actual bailouts		
		Yes	**No**	**Total**
Cutoff point = 50%				
Classified bailouts	**Yes**	18 [c)]	4 [d)]	22
	No	5 [d)]	26 [c)]	31
	Total	23	30	53
Cutoff point = 10%				
Classified bailouts	**Yes**	22 [c)]	16 [d)]	38
	No	1 [d)]	14 [c)]	15
	Total	23	30	53
Cutoff point = 5%				
Classified bailouts	**Yes**	22 [c)]	18 [d)]	40
	No	1 [d)]	12 [c)]	13
	Total	23	30	53

[c)] Correct classification

[d)] Incorrect classification

3.5 Conclusion

Governments intervened massively and repeatedly to support banks during the financial crisis in order to ensure their survival. Due to the uniqueness of banks and their impact on the stability of the financial system, several rescue programmes were adopted. Given the tremendous and costly bailout packages worldwide, the analysis of the determinants of the likelihood of banks being bailed out is of the utmost importance, namely in the process of reforming the financial regulation, the weaknesses of which were revealed by the global financial crisis. The results of our study therefore have relevant public policy implications. Overall, our results show that a set of characteristics of the board, bank risks and control variables have predictive power in explaining the probability of bailouts. Specifically, banks with more experienced boards, longer tenure and less busy supervisory directors are less likely to be bailed out. So, strong emphasis should be placed on the analysis of the board of a bank. On the other hand, both credit risk and liquidity risk, as well as the country-specific banking sector factors, concentration and international exposure, increase the likelihood of a bank participating in a bailout programme. These qualitative findings are unchanged in all regressions. Also, in the baseline model, board independence, performance prior to the financial crisis, the existence of a corporate governance committee and the level of economic development, measured by GDP *per capita*, have predictive power.

Additionally, we first examine the impact of the existence of an audit committee and, second, the impact of the supervisory and regulatory environment variables. We find that the existence of an audit committee and the index of financial freedom are, respectively, negatively and positively associated with the likelihood of bailouts. These findings are consistent with the idea that the presence of an audit committee strengthens board monitoring and reduces agency costs and that greater freedom, acting as a contagion channel of shocks, has a detrimental effect.

Appendices

Appendix 3.1 – Variables definitions

Variables	Definitions	Measurement period	Data sources
Bank bailouts	A dummy variable equal to 1 if the bank is bailed out any time over the period from July 2007 to December 2009, 0 otherwise.	July 2007 to December 2009	European Comission website; Bank's official website; Annual Reports; Google website
Board independence	Percentage of independent directors, that is, the number of independent board directors on the board divided by board size.	December 2006	BoardEx
Board size	Total number of directors serving on the board of the bank.	December 2006	BoardEx
CEO duality	A dummy variable equal to 1 if the CEO is also the Chairman, 0 otherwise.	December 2006	BoardEx; Annual Reports
Board experience	Supervisory directors' average years of experience in the banking sector. To track banking experience we examine each supervisory director's biography as provided in the BoardEx database. First, we compute the number of years each supervisory director has worked in the banking sector and sum all these years. Second, we divide this total by the number of supervisory directors on the board of the bank.	December 2006	BoardEx
Director tenure	Average length of time, stated in years, that the supervisory directors have been on the bank's board.	December 2006	BoardEx
Board busyness	Average number of board positions (number of directorships) held by supervisory directors.	December 2006	BoardEx
Credit risk	Non-performing loan ratio, calculated as non-performing loans to total loans; Alternatively, non-performing assets ratio, calculated as non-performing assets to total assets.	December 2006	Datastream
Liquidity risk	Loan-to-deposit ratio, that is, total loans divided by total deposits. Alternatively, ratio of total deposits to total assets, that is, total deposits divided by total assets.	December 2006	Datastream
Growth risk	Market-to-book ratio, that is, ratio of the market value of equity to the book value of equity. Alternatively, percentage of assets growth in the year immediately prior to the financial crisis.	December 2006	Datastream
Bank size	Natural logarithm of the bank's market capitalisation.	December 2006	Datastream

Appendix 3.1 – Variables definitions *(cont.)*

Variables	Definitions	Measurement period	Data sources
Bank size *(cont.)*	Alternatively, natural logarithm of the bank's assets.	December 2006	Datastream
Capital	Bank capital, computed as the ratio of total equity to total assets.	December 2006	Datastream
2006 performance	Buy-and-hold stock returns.	January 2006 to December 2006	Datastream
Institutional ownership	Percentage of shares owned by institutional investors.	December 2006	Thomson Financial
CG committee	A dummy variable equal to 1 if the bank has a corporate governance committee, 0 otherwise.	December 2006	BoardEx; Annual Reports
Audit committee	A dummy variable equal to 1 if the bank has an audit committee, 0 otherwise.	December 2006	Datastream
Concentration	Measure of concentration in the banking industry. Assets of the five largest banks as a share of total commercial banking assets. Alternatively, assets of the three largest banks as a share of total commercial banking assets.	December 2006	World Bank website[50]
IIBIS	Measure of the degree of international integration. Ratio of consolidated foreign claims to GDP of the banks that are reporting to BIS.	December 2006	World Bank website[51]
Foreign	Percentage of the number of foreign owned banks to the number of the total banks in an economy. A foreign bank is a bank where at least 50% of its shares are owned by foreigners	December 2006	World Bank website[52]
GDP *per capita*	Natural logarithm of GDP *per capita.*	December 2006	World Bank website[53]
Official index	The official supervisory powers index measures the degree to which the country's commercial bank supervisory agency has the authority to take specific actions. It is composed of information on many features of official supervision: 1. Does the supervisory agency have the right to	2007 (revised June 2008)[54]	World Bank website;[55] Barth et al. (2008)

[50] Global Financial Development Database, available at: http://data.worldbank.org/data-catalog/global-financial-development
[51] Global Financial Development Database, available at: http://data.worldbank.org/data-catalog/global-financial-development
[52] Global Financial Development Database, available at: http://data.worldbank.org/data-catalog/global-financial-development
[53] Global Financial Development Database, available at: http://data.worldbank.org/data-catalog/global-financial-development
[54] We use data as close as possible to the financial crisis.
[55] Survey of Bank Regulation and Supervision carried out by the World Bank, available at: http://econ.worldbank.org/WBSITE/EXTERNAL/EXTDEC/EXTRESEARCH/0,,contentMDK:20345037~pagePK:64214825~piPK:64214943~theSitePK:469382,00.html#Survey_III

Appendix 3.1 – Variables definitions *(cont.)*

Variables	Definitions	Measurement period	Data sources
Official index *(cont.)*	meet with external auditors about banks? 2. Are auditors required to communicate directly to the supervisory agency about elicit activities, fraud, or insider abuse? 3. Can supervisors take legal action against external auditors for negligence? 4. Can the supervisory authority forcea bank to change its internal organisational structure? 5. Are off-balance sheet items disclosed to supervisors? 6. Can the supervisory agency order the bank's directors or management to constitute provisions to cover actual or potential losses? 7. Can the supervisory agency suspend the directors' decision to distribute: a) Dividends? b) Bonuses? c) Management fees? 8. Can the supervisory agency supersede the rights of bank shareholders-and declare a bank insolvent? 9. Can the supervisory agency suspend some or all ownership rights? 10. Can the supervisory agency: a) Supersede shareholder rights? b) Remove and replace management? c) Remove and replace directors? The official supervisory index has a maximum value of 14 and a minimum value of 0, where higher values indicate greater power.	2007 (revised June 2008)	World Bank website;[56] Barth et al. (2008)
Financial freedom	Indicator of financial and banking freedom specifically, whether foreign banks are able to operate freely, whether the government influences allocation of credit, how difficult it is to open domestic banks and other financial services firms, to which extent the financial system is regulated, the presence of State-owned banks and whether banks are free to provide insurance and securities services to customers. The index ranges from 0 to 100, with high values signifying more freedom and thus fewer restrictions.	December 2006	Heritage Foundation website[57]
Freedom corruption	Indicator of freedom from corruption. Values range from 0 to 100, with higher values indicating lower levels of corruption.	December 2006	Heritage Foundation website[58]

[56] Global Financial Development Database, available at: http://data.worldbank.org/data-catalog/global-financial-development
[57] http://www.heritage.org
[58] http://www.heritage.org

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CHAPTER 4

WHAT EXPLAINS EUROPEAN BANKS' RISK-TAKING IN THE CONTEXT OF THE 2007-2008 FINANCIAL CRISIS? A SIMULTANEOUS EQUATIONS APPROACH

4 WHAT EXPLAINS EUROPEAN BANKS' RISK-TAKING IN THE CONTEXT OF THE 2007-2008 FINANCIAL CRISIS? A SIMULTANEOUS EQUATIONS APPROACH

Abstract

The global financial crisis has led to an increasingly focused attention on excessive bank risk-taking and one of the consequences is that the role of internal governance mechanisms, such as the board of directors, in monitoring risk has come under greater scrutiny.

In this paper we examine the impact of board structure, ownership structure, risk governance mechanisms and other bank-specific factors on bank risk-taking for a sample of 72 publicly listed European banks. Using a simultaneous equations approach, our main findings indicate that the proportion of independent directors, board size and Chief Executive Officer (CEO) power (or CEO authority) negatively affect bank risk-taking in the financial crisis. On the contrary, institutional shareholders positively influence bank risk-taking and both the existence of a risk committee and a Chief Risk Officer (CRO) who is a member of the board have no significant impact. The results remain unchanged when applying the three-stage least squares (3SLS) and the two-stage least squares (2SLS) estimation methods as well as when all variables are winsorised, except for CEO power which has no predictive power using 2SLS.

Additionally, we replicate our analysis for the period before the financial crisis (proxy for "stable" periods) to test whether the impact of governance mechanisms and other determinants of risk-taking depend on environmental conditions and we conclude that it is indeed sensitive to the economic context. In fact, we find that some of them are relevant in crisis conditions but not in non-crisis conditions and thus, their impact depends on macroeconomic conditions. Also, the results are robust to the use of the alternative estimation method (3SLS and 2SLS) and winsorisation.

Keywords: Corporate Governance, Banks, Financial Crisis, Risk, Simultaneous Equations Approach.

JEL classification: G01; G21; G34.

4.1 Introduction

Throughout the world, by the end of 2008, many banks had seen most of their equity destroyed by the crisis initiated in 2007 in the United States (US) subprime sector, considered the largest since the Great Depression, 1929-1932 (e.g., Beltratti and Stulz, 2012). This illustrates how vulnerable and unprotected economies are to the irresponsible risk-taking behaviour by financial institutions in general and banks in particular. For Stulz (2015) the success of banks and the health of the financial system depend in a critical manner on how they take risks. Undue risk-taking by banks threatens the safety and soundness of individual institutions as well as the stability of the entire financial sector (Srivastav and Hagendorff, 2016).

In the context of the financial crisis, several academics and practitioners argue that the mechanisms of corporate governance did not serve their purpose to properly safeguard the interests of stakeholders, increasing risk-taking without appropriate management (Ferrero-Ferrero et al., 2012). "*In retrospect, it seems clear that many banks took excessive risks in the mid 2000s*" (Fortin et al., 2010, p. 892). Given the significance of the risk-taking behaviour in the recent crisis context and the renewed emphasis on bank internal governance mechanisms, especially the board of directors, studying bank risk-taking and whether bank governance influences the level of risk undertaken is extremely relevant.

Bank risk is a major concern for bank regulators due to the special role that the banking sector plays in the economy. "*Increased riskiness of banks to the extreme may lead to financial crises and the collapse of the financial system, causing huge negative externalities to the entire economy*" (Deng et al., 2013, p. 387), as witnessed during the financial crisis of 2007-2008. As banks are crucial to the stability of the financial system they are more tightly regulated. Moreover, the problems with poor governance are more severe for banks than for non-bank firms and their failures have even more substantial costs (Pathan, 2009). This is, because banks are "special" firms due to their distinct roles in financial intermediation[59] (payments system, and liquidity, amongst others). The critical role of the board of directors, in order to ensure sound governance,

[59] The principal distinctive attribute of banks is their liquidity production function (Macey and O'Hara, 2003; Mülbert, 2009). By holding illiquid assets and issuing liquid liabilities, banks create liquidity for the economy, see Diamond and Dybvig (1983).

is especially important in banks because the fiduciary duties of directors ("duty of care" and "duty of loyalty") expand beyond shareholders to depositors, other creditors and regulators [60] (e.g., Macey and O'Hara, 2003). Therefore, shareholders are not the exclusive beneficiaries of directors' fiduciary duties.

The Basel Committee on Banking Supervision, in its final document "Principles for Enhancing Corporate Governance", attributes to the board a vital role in monitoring and guiding corporate strategy and risk policy, as the board should *"approve and oversee the implementation of the bank's overall risk strategy, including its risk tolerance/appetite; policies for risk, risk management and compliance; internal controls system; corporate governance framework, principles and corporate values (…)*" (BCBS, 2010, p. 8). Also, for Srivastav and Hagendorff (2016) the board has an overall responsibility for providing oversight into the monitoring of bank management and implementing an effective system of risk governance. The opacity of banks and the singularity of their assets make the risk-taking problem more serious for these institutions compared to non-financial firms, and risk-taking is critical to corporate success (Nakano and Nguyen, 2012).

Notwithstanding the greater severity of the 2007-2008 financial crisis, the past decades have also been characterised by repeated banking crises, such as the 1994-1995 Mexican and the 1997-1998 Asian financial crises. Such episodes highlight the inherently unstable nature of banking and the tendency of banks toward excessive risk-taking (Barry et al., 2011) and justify an adequate analysis of the factors behind the risk-taking incentives of banks. To prevent further crises, it is imperative to understand the factors that influence corporate risk-taking (Jiraporn et al., 2015).

Our main purpose is, thus, to analyse the impact of a set of corporate governance mechanisms, such as board characteristics and ownership structure, on the risk-taking by publicly held European banks. In fact, despite the increased debate regarding the role of the mechanisms of corporate governance (particularly the boards of directors) in solving the conflicts of interest between stakeholders, few papers have focused their

[60] Also, Macey and O'Hara (2003, p. 93) argue that "*to the extent that fiduciary duties lower agency costs by reducing the freedom of management to act in its own unconstrained self-interest, such duties will be especially valuable devices in the banking context because of the inherent difficulties in monitoring banks*."

attention on corporate risk-taking (Pathan, 2009) and even less have focused on the crisis period and on a non-US sample. So, our study attempts to fill this gap in the literature. Additionally, we replicate the analysis for the period before the financial crisis (using data pertaining to 2006) in order to analyse whether our results are sensitive to the economic conditions. The underlying idea is that governance mechanisms may operate differently in crisis and non-crisis periods.

We take into account the bi-directional causality between risk and board characteristics. According to some existing literature, the causal nature of the relationship between these variables is not completely clear: it is possible that not only board characteristics may impact risk-taking, but also that risk-taking may affect board characteristics. For instance, banks increase risk-taking in response to poor corporate governance (e.g., the structure of the board of directors may affect its ability to function effectively and so, corporate boards influence risk-taking) or poor corporate governance of banks is a consequence of greater risk-taking by banks (and thus, risk-taking determines governance) meaning in that case that the effectiveness of the board of directors depends on the bank risk-taking? To identify the underlying causal relationship we apply a system of simultaneous equations, which treats risk-taking and board characteristics as being endogenous. The board features variables endogenised in the system are board independence and board size. On the one hand, more independent directors lead to less risk-taking (Pathan, 2009; Ferrero-Ferrero et al., 2012) and smaller board size results in more risk-taking (Cheng, 2008; Pathan, 2009; Nakano and Nguyen, 2012). On the other hand, bank risk may impact on both board independence and board size. Linck et al. (2008), for example, report that high stock return volatility is associated with smaller and less independent boards.

Our paper seeks to contribute to the existing literature in three fundamental ways.

First, our study explores the relationship between a set of corporate governance variables, as well as various bank specific characteristics, and risk-taking for a non-US sample of banks. It covers the global financial crisis, that is commonly directly linked to the much criticised risk-taking behaviour of banks, in which we witness a renewed focus on bank internal governance mechanisms. Therefore, in this context, it is timely to analyse the relationship between governance and risk.

Second, our study provides a cross-country analysis of the determinants of bank risk-taking from a contextualised agency theory perspective.[61] We expand the analysis by investigating whether the impact of corporate governance mechanisms is contingent upon environmental circumstances and the extent to which governance recommendations are universally valuable. So, we analyse the explanatory factors of risk not only during the financial crisis but also before the crisis, as a proxy for "normal" periods. Thus, our study contributes to the growing body of literature that suggests that the efficacy and universality of governance prescriptions and impact may depend on firm-specific context or contingencies (e.g., Aguilera and Jackson, 2003; Judge, 2012; Desender et al., 2013).

Third, when analysing the two issues above we address the endogeneity problem arising from a potential simultaneity bias using a simultaneous equations framework.

In summary, our main findings show that board independence, board size, CEO power and institutional ownership influence bank risk-taking in the financial crisis but CEO power loses its predictive power in the non-financial crisis period. Also, we find statistical significance for some control variables as is the case of bank size.

The remainder of the study proceeds as follows. Section 4.2 presents the literature review and the hypotheses development, Section 4.3 describes the data and methodology, Section 4.4 provides the empirical results and Section 4.5 provides the conclusion.

4.2 Literature review and hypotheses development

In this section, we review the existing literature on corporate risk-taking that allows us to identify its determinants and we develop the hypotheses that support the risk model. We present arguments that justify the expected relationship between a set of corporate governance variables, such as board characteristics and ownership structure, and bank risk-taking.

[61] Contextualised agency theory perspective in the sense that the agency theory must adequately consider the context and so, take into account the governance environment (e.g., Judge, 2012).

4.2.1 Board independence and bank risk-taking

There is sparse literature that analyses the relationship between board composition and corporate risk-taking (Ferrero-Ferrero et al., 2012). However, the effectiveness with which the board of a bank monitors bank managers and limits their opportunistic behaviour depends upon its characteristics, such as size and composition (Pathan, 2009). Prior (and more abundant) studies analyse the relationship between board independence and performance, however the relation between board independence and risk-taking might not be in the same direction. For example, although Erkens et al. (2012) find that financial firms with more independent boards performed worse during the crisis, they do not find that firms with more independent boards took more risk prior to the crisis. Their findings are, thus, inconsistent with independent board members having encouraged managers to take greater risk in their investment policies before the onset of the crisis. In turn, Pathan (2009) finds that more independent directors lead to less risk-taking by banks in the period 1997-2004, which may occur because independent directors are more sensitive to regulatory compliance. Ferrero-Ferrero et al. (2012) find that higher proportion of independent directors on a board leads to lower levels of corporate risk-taking in an economic recession period (2008) but not in a period of economic growth. Based on the above studies, the first hypothesis (H_1) is stated as follows:

H_1: Board independence is negatively related to bank risk-taking.

4.2.2 Board size and bank risk-taking

Board of directors is an essential governance mechanism that can mitigate the agency problem between management and shareholders. A board characteristic which is perceived to affect its ability to function effectively is its size. Although there is no optimal board size for all firms (Coles et al., 2008), the size of the board appears to affect corporate value (e.g., Staikouras et al., 2007; Guest, 2009; Adams and Mehran, 2012; Pathan and Faff, 2013), firm policy choices and risk-taking (Cheng, 2008; Pathan, 2009; Nakano and Nguyen, 2012; Wang, 2012; Huang and Wang, 2015). However,

while the impact of board size on the performance of firms is well documented in literature, relatively few studies explicitly investigate how risk-taking by firms is related to board size (Wang, 2012). Board size affects the decision-making process and the effectiveness of the board and, in turn, the decision-making process and the quality of monitoring impact on risk-taking. Several prior studies on group decision-making (in the fields of economics and social psychology) suggest that it takes more effort for a larger group to reach a consensus, and so the final decisions of larger groups reflect more compromises and are less extreme than those of smaller groups (e.g., Moscovici and Zavalloni, 1969; Sah and Stiglitz, 1986, 1991). Thus, it is likely that by making less extreme decisions, larger boards are associated with less variability of corporate performance. Although for Jensen (1993, p. 865) "*when boards get beyond seven or eight people they are less likely to function effectively and are easier for the CEO to control*", a larger board also "*moderate the extremity of board decisions, as it takes more negotiation and compromise for a larger board to reach a final decision*" (Cheng, 2008, p. 159). For Moscovici and Zavalloni (1969) larger groups should express moderate positions that represent a compromise among individual positions. Also, for Sah and Stiglitz (1986, 1991) the final decision of a group reflects a compromise among different views of each group member. So, riskier projects are more likely to be rejected because it is more difficult to reach an agreement in a large group.[62] Additionally, Sah and Stiglitz (1991) show that the decision quality of large boards has less variability. Consistent with the above arguments related to the literature on group decisions, and applied to corporate boards, Cheng (2008) shows that firms with larger boards exhibit lower performance volatility. Also, in a sample of US firms, the results of Wang (2012) support the hypothesis that board size has a negative impact on risk-taking by firms. In addition, in the case of US bank holding companies (BHCs) (Pathan, 2009), Japanese firms (Nakano and Nguyen, 2012) and Chinese firms (Huang and Wang, 2015) board size is associated with lower return volatility. This finding is confirmed by Ferrero-Ferrero et al. (2012) in an economic growth period but not during the financial crisis.

Supported by the literature on group decisions and following the previous studies, we hypothesise that smaller boards tend to encourage and approve risky policies and

[62] The same is true for good projects as their approval also requires a convergence of opinions between group elements. So, larger groups select neither very good nor very bad projects, that is, they choose projects whose performance tends to be more stable.

consequently lead to higher risk-taking by banks. Thus, we formulate the second hypothesis (H_2) as follows:

H_2: Board size is negatively related to bank risk-taking.

4.2.3 CEO power and bank risk-taking

The structural CEO power is based on his/her formal position in the firm (Daily and Johnson, 1997). It comes from the CEO having legitimate authority over others because of the nature of the position (Finkelstein, 1992). As a central element of the top management team, the CEO occupies a position of unique influence in the firm. Sources of structural power, such as the dual leadership structure (CEO duality), are the most commonly employed proxies of CEO power. CEO duality refers to the situation where the CEO is also the Chairman of the board.

According to the agency theory, board effectiveness in monitoring and controlling management will be reduced when duality is present, in which case the board will have less power and the monitoring of the CEO will be lessened. Most arguments against CEO duality leadership are based on the issue of power concentration on dual CEOs (Daily and Dalton, 1997). Concentrated power may protect the CEO/Chairman from board oversight (Daily and Dalton, 1997), enabling dual CEOs to dominate the board and promote CEO entrenchment (Finkelstein and D'Aveni, 1994). Also, a dual CEO can exercise significant influence on the board by restricting the flow information and through intervening in the process of new director selection and appointments. "*When the CEO and board chair positions are split, the board should have more power and, thus, influence in new director selection"* (Westphal and Zajac, 1995, p. 66). Agency theory supported by the divergence of interests when ownership and control of the firm are separate, which creates "agency problems" between shareholders and managers, specify that, in order to protect their non-diversifiable human capital (talent, job related experience), managers will be more risk averse than shareholders (Amihud and Lev, 1981; Eisenhardt, 1989; Beatty and Zajac, 1994). To the extent that bank managers have concentrated wealth including their non-diversifiable and non-tradable human capital, they are expected to protect this internally by selecting safer projects or by

diversification[63] (May, 1995). While shareholders can easily diversify their investment risk in the capital market, managers can only do so at the firm level (May, 1995). So, shareholders hope that managers invest in all positive net present value projects, irrespective of the risk associated with these projects (Guay, 1999). However, due to a lack of diversification, risk-averse managers may choose to renounce on some positive net present value projects that would increase the risk of the firm (Guay, 1999). Additionally, bank managers can have different risk-taking incentives if they are remunerated through fixed compensation (e.g., salary) rather than variable compensation (e.g., shares, options and bonuses). When receiving fixed compensation, managers may behave in a risk-averse manner and so they are reluctant to take the risky projects because their rewards from the risk-taking are limited.[64] "*This is because managers have little to gain if their banks do exceptionally well (their salaries are fixed) but probably will lose their jobs and human capital investments in a bank if they fail*" (Saunders and Cornett, 2008, p. 557). Thus, risk-averse bank managers may accept safer, value-decreasing projects, and reject riskier, but value-increasing, projects. The previous arguments suggest that as risk-averse managers, bank CEOs are motivated to take less risk. In short, in the agency theory framework, powerful CEOs are expected to pursue actions and make decisions, which are in their own personal best interests, and so, because of the assumption of risk aversion it will not be anticipated that they make choices that are considered risky. Accordingly, Kim and Buchanan (2008) provide empirical evidence that firms adopting CEO duality leadership show significantly lower levels of risk. Pathan (2009), using a sample of US BHCs, also finds that CEO power is associated with lower bank risk, although Lewellyn and Muller-Kahle (2012) in their study of subprime lending firms in the US find that CEO power is positively related to excessive risk-taking.

In accordance with the agency theory, managers opt for less risky projects in order to protect their wealth in terms of job, salary and other perks. As risk-averse managers, bank CEOs have incentives to take less risk. Hence, our third hypothesis (H_3) is stated as follows:

[63] According to May (1995) CEOs with more non-diversifiable wealth vested in the firm will have more incentive to decrease personal risk through diversification. As human capital invested in the firm increases, there is more incentive to reduce firm-specific risk.

[64] For instance, for Fortin et al. (2010), US BHCs that pay CEOs high base salaries take less risk, while BHCs that grant CEOs more in stock options or that pay CEOs higher bonuses take more risk.

H3: CEO power is negatively related to bank risk-taking.

4.2.4 Institutional ownership and bank risk-taking

In recent decades, institutional investors have become the largest shareholders of publicly traded firms (Deng et al., 2013). According to the literature, agency problems and risk-taking behaviour are distinctive depending on the nature of the shareholder. Institutional investors (e.g., investment advisors, pension funds and hedge funds) who exert significant voting power can influence the nature of corporate risk-taking activity (Wright et al., 1996; Barry et al., 2011). Regarding "*shareholder size and expertise in processing information and monitoring managers, such investors are different from atomistic individual investors because they can exercise greater control for reasons of economies of scale in corporate supervision*" (Barry et al., 2011, p. 1328). Theory and empirical evidence confirms that institutional investors can provide active monitoring that is difficult for smaller, more inactive or less informed investors.[65] However, the intensity of institutional investors' monitoring can be limited by distinct factors such as the potential business relationship with the firm (e.g., Brickley et al., 1988) and concerns about the liquidity of their portfolios (e.g., Coffee, 1991; Bhide, 1994). Also, since institutional investors have a diversified portfolio of investments, they may have lower incentives to exercise control (Barry et al., 2011).

The *Information Asymmetry Hypothesis* (Zeckhauser and Pound, 1990) predicts that a firm's operations may be so difficult to understand, that even a large shareholder may not be able to monitor it effectively. Thus, the opaque nature of banking gives institutional investors little control over bank managers. Conversely, the *Prudent Man Hypothesis* predicts the opposite. "*According to this hypothesis institutional investors as large blockholders have more expertise, resources and incentives for monitoring bank management, and are less subject to the information asymmetries suffered by other stockholders*" (Chun et al., 2011, p. 160). Institutional investors and blockholders might also affect firm value and risk-taking through their influence on managerial decisions.[66]

[65] See, for example, Gillan and Starks (2000), Woidtke (2002) and Hartzell and Starks (2003).
[66] Although monitoring by institutional investors may affect many firms' decisions, much of its influence is not observable (e.g., projects not taken) and hence difficult to test and evaluate (Almazan et al., 2005).

Existing studies have shown that institutional investors play a major role in monitoring the investee firms and in directing their crucial decisions such as executive compensation structure (Hartzell and Starks, 2003; Almazan et al., 2005) and firm diversification (Deng et al., 2013). On the one hand, institutional investors, acting under due-diligence and prudent behaviour rules, may try to avoid risk by furthering diversification. Accordingly, they could promote greater diversification and lower risk because their wealth is closely tied to firm value, which becomes more volatile with risk. In particular, hired-manager banks become less risky when a given owner has his/her wealth highly concentrated in the bank (Sullivan and Spong, 2007), as is the case of institutional owners. On the other hand, institutional investors might have incentives to increase the firm's risk in order to increase its value and consequently, their own wealth. In this context, Shleifer and Vishny (1986) argue that blockholders may restrict managers from investing in risk-reducing strategies that reduce shareholder value. Institutional investors have similar motivations. Accordingly, Wright et al. (1996) find evidence that institutional investors positively influence risk-taking for firms with larger growth opportunities. Regarding banks, Barry et al. (2011) find that ownership structure is significant in explaining risk differences but mainly for privately owned banks. Institutional investors impose the riskiest strategies when they hold higher stakes. For publicly held banks, changes in ownership structure do not influence risk-taking (Barry et al., 2011). Market forces seem to align the risk-taking behaviour of publicly held banks, such that ownership structure is no longer a determinant in explaining risk differences. However, Deng et al. (2013) find that large and stable institutional ownership is associated with a higher level of diversification and lower risk, suggesting that institutional investors are prudent and favour risk-reducing diversification strategies. They show that institutional shareholders exerted greater influence on publicly traded BHCs' diversification decisions during the crisis period, which in turn lowers firm insolvency risk. On the contrary, Erkens et al. (2012) find that financial firms with higher institutional ownership took more risk prior to the crisis, which resulted in larger shareholder losses during the crisis period. In other words, firms with higher institutional ownership experienced worse stock returns during the crisis period because institutional shareholders encouraged managers to increase shareholder returns through greater risk-taking prior to the crisis. Institutional investors

may find it optimal to increase risk, in order to increase their returns, because they do not internalise the social costs of financial institution failures. Additionally, institutional arrangements such as deposit insurance may weaken debtholder discipline. More recently, Cheng et al. (2015) also find a positive relationship between institutional investors and risk-taking choices. Accordingly, the fourth hypothesis (H_4) is formulated as follows:

H_4: Institutional ownership is positively related to bank risk-taking.

4.2.5 Risk governance mechanisms and bank risk-taking

In many recent public policy documents, published in the aftermath of large-scale financial scandals and the financial crisis, "*one common recommendation is to "put risk high on the agenda" by creating respective structures*" (Aebi et al., 2012, p. 3214). Specific measures involve either the establishment of a dedicated risk committee or designating a CRO who oversees all relevant risks within the firm (Brancato et al., 2006; Mongiardino and Plath, 2010; Sabato, 2010). Mongiardino and Plath (2010) present evidence that risk governance at large banks seems to have improved only to a limited extent since the beginning of the financial crisis, despite market and regulatory pressures. Most large banks run complex businesses, with many distinct business lines, frequently including non-banking activities. Understanding fully all the risks to which banks are exposed requires both skill and time. Thus, Mongiardino and Plath (2010) describe best practices in the banking industry risk governance and emphasise the need to have: (1) a dedicated board-level risk committee to supervise all types of risk, (2) a risk committee in which the majority of its members should be independent and at least some of them should have previous risk management experience and (3) a CRO who should be a member of the bank's executive committee and report jointly to the CEO and the board. "*While the full board retains ultimate responsibility for risk supervision, it is unrealistic to expect it will perform its duties effectively without a robust committee structure*" (Mongiardino and Plath, 2010, p. 118). Also, the lack of visibility of the CRO at board level is one of the main issues that should be solved in order to ensure the independence of the risk function (Sabato, 2010). For Sabato (2010) the risk governance

structure may have played a crucial role in the failure of risk management practices at most banks. The existence of a separate risk committee as well as the presence of a CRO, whose position and reporting line ensure an appropriate level of accessibility to the board of directors, are important elements of robust risk governance. Also, for Stulz (2015), risk managers play a crucial role in measuring, monitoring and managing risk.

In accordance with high-quality risk governance practices, we expect that the existence of a separate risk committee as well as a CRO who is a board member induce the board to take less risk. Hence, we predict the fifth hypothesis (H_5) as follows:

H_5: Risk governance mechanisms, (existence of a separate risk committee and a CRO who is a board member) are negatively related to bank risk-taking.

4.3 Data and methodology

In this section we characterise the bank sample and the data sources. Further, we describe in detail the variables used in the regression equations and, finally, we present the empirical framework.

4.3.1 Sample and data sources

Our cross-country sample includes 72 publicly listed European banks. The data is sourced from Datastream, BoardEx, Thomson Financial and annual reports. The information on bank risk-taking was collected from Datastream, with the detailed data on bank board characteristics and risk governance structure mostly obtained from BoardEx and complemented with information contained in the annual reports. Finally, the information on ownership was extracted from Thomson Financial. In the risk-taking analysis we consider two different periods: during the financial crisis (2007-2008) and before the financial crisis, or stable period (2006). So, we collect data from three different years: 2006, 2007 and 2008. For the crisis period we use average data. Accordingly, for each explanatory variable we compute the average value of the crisis period using data from 2007 and 2008, except for dummy variables.

4.3.2 Variables description

In this sub-section we describe in detail the set of variables considered in our study: the dependent variable, the main explanatory variables and the control variables. A clear definition of each of them is provided. Please see Appendix 4.1.

4.3.2.1 Dependent variable

The dependent variable is a risk variable, *Bank risk*, which represents the risk-taking by a bank. A significant body of literature uses the standard deviation of stock returns as a measure of risk-taking (Anderson and Fraser, 2000; Cheng, 2008; Laeven and Levine, 2009; Pathan, 2009; Fortin et al., 2010; Ferrero-Ferrero et al., 2012; Nakano and Nguyen, 2012). So, following previous studies, our risk measure is calculated as the standard deviation of the bank's daily stock returns and represents total risk. [67] This measure captures the overall variability in bank stock returns and incorporates the market's perception on the risks underlying the bank's positions (Pathan, 2009).

4.3.2.2 Independent variables

The independent variables according to our hypotheses are: *Board independence, Board size, CEO power*, *Institutional ownership, Risk committee* and *CRO*. *Board independence* is the percentage of independent directors. *Board size* is the total number of directors on the board. *CEO power*, which is used to capture CEO influence over bank board decisions, is a dummy variable with a value of one if the CEO is simultaneously the Chairman of the board and zero otherwise. Regarding ownership structure we define *Institutional ownership* as the percentage of shares owned by institutional investors. Finally, two proxies of risk governance mechanisms are used.

[67] Total risk includes both the risk involved in the particular stock (idiosyncratic risk) and market risk (systematic risk).

Our first proxy is *Risk committee,* which is a dummy variable that takes the value of one if the bank has a separate risk committee and zero otherwise. Our second proxy is *CRO*, which is a dummy variable that takes the value of one if the CRO is a board member and zero otherwise.

4.3.2.3 Control variables

Other variables that may affect bank risk are used to control for differences in the sample of banks so that the actual relationship between the independent and dependent variables can be determined. The control variables that we use as determinants of policy choices and bank risk are in accordance with the existing literature. Five variables are included to control for: (1) the previous position of the bank's Chairman or, more specifically, whether the Chairman is an ex-CEO (*Chair ex_CEO)*, (2) bank past performance (*Performance*), (3) bank size (*Bank size)*, (4) bank capital (*Capital*) and (5) growth opportunities (*Growth opportunities*).

The effectiveness of the Chairman's role in a given firm can be compromised if the Chairman has previously served CEO of this firm given that he/she may not be (completely) independent from current management. Because of the potentially inactive and ineffective role of a Chairman that is an ex-CEO, due to his/her previous relationship with the bank, we expect that banks in which the Chairman has also occupied the CEO position exhibit more risk. *Chairman ex_CEO* is a dummy variable, which equals one if the current Chairman has previously occupied the position of CEO in the bank and zero otherwise.

Since it is possible that banks change their level of risk-taking following previous performance, we use, similarly to Cheng (2008), lagged performance as a control variable. Managers with poor prior performance may be inclined to take up excessive risk in the hope of meeting performance targets (Van Wesep and Wang, 2014). If a bank does not meet the targeted bank performance in the previous year, managers in an attempt to meet these targets in the current year may take more risk. In this case, performance of the previous year will be associated with higher bank risk in the current year. Accordingly, the results of Wiseman and Bromiley (1996) suggest that

organisational decline positively influence risk. Similarly, Singh (1986) finds that poorly performing organisations engage in more risk taking than organisations that are performing well. Also, other previous studies find a negative risk-return association for firms having returns below target levels and a positive association for those with returns above target (e.g., Fiegenbaum and Thomas, 1988). Thus, we use bank past performance (*Performance)* as control variable. *Performance* is computed as the natural logarithmic of the ratio of the stock price (adjusted), that is, $ln\ (P_{it}/P_{it-1})$.

It has been argued that firm size affects a number of organisational outcomes, namely risk-taking, and so, very often it is used as control variable in several papers (Cheng, 2008; Pathan, 2009; Barry et al., 2011; Ferrero-Ferrero et al., 2012; Lewellyn and Muller-Kahle, 2012; Nakano and Nguyen, 2012; Wang, 2012; Deng et al., 2013; Huang and Wang, 2015). The theoretical arguments that justify the relationship between bank size and risk-taking are conflicting. On the one hand, in accordance with the "too big to fail" issue, bank size increases bank risk-taking. On the other hand, due to the diversification effect, bank size reduces bank risk-taking. *Bank size*, used to control for differences in sizes of the banks, is measured by the natural logarithm of market capitalisation as, for example, Wang (2012).

As in other studies (e.g., Cheng, 2008; Pathan, 2009; Barry et al., 2011; Nakano and Nguyen, 2012), we control for bank capital. Although Cheng (2008) reports that leverage has no impact on the volatility the shares of US firms, Nakano and Nguyen (2012) find that leverage has a positive effect on the volatility of stock returns, meaning that as leverage increases the level of risk also increases. Our measure of bank capital (*Capital*) is defined as shareholders total equity over total assets. We expect that higher capitalised banks are subject to less risk.

Finally, in accordance with past research, (Wang, 2012; Huang and Wang, 2015), we control for growth opportunities (*Growth opportunities*). Specifically, we use the market-to-book ratio, defined as the ratio of the market value of equity to the book value of equity, as a proxy for growth opportunities. Huang and Wang (2015) find a positive relationship between the market-to-book ratio and risk-taking, consistent with the idea that as more growth opportunities are available firms have stronger incentives to pursue riskier strategies.

We also control for possible country-specific effects by including country dummies, *DCountry* variable.

4.3.3 The endogeneity issue and the determinants of board characteristics

Given the theoretical and empirical discussion in Section 4.2 we identify a set of explanatory variables of bank risk and their association. However, based on previous literature, the causal nature of these relationships is not clear: board attributes may affect risk-taking but risk-taking may also determine a specific board structure. Accordingly, we take into consideration the bi-directional causality and complex interrelationships that may exist between risk-taking and board characteristics, more specifically board independence and board size. On the one hand, the causal relationship between the variables may result from board independence and board size to corporate performance variability. Pathan (2009) and Ferrero-Ferrero et al. (2012) for example, find that a higher level of independent directors leads to a lower level of risk-taking and Cheng (2008) and Nakano and Nguyen (2012) show that larger boards lead to lower variability of performance. Also, for Huang and Wang (2015) smaller boards are associated with riskier firm policy choices and consequently greater firm risk. On the other hand, the causal association between the variables may result from corporate performance variability to board independence and board size. For instance, Boone et al. (2007) and Linck et al. (2008) show that stock return variability is negatively related to independent directors and board size.

4.3.3.1 Explanatory variables of endogenous board characteristics

Existing literature on boards of directors treats the independence and size of the board as endogenous variables (Hermalin and Weisback, 2003; Adams and Ferreira, 2007) and provides evidence regarding the determinants of these board characteristics (Boone et al., 2007; Coles et al., 2008; Linck et al., 2008). In order to estimate the

equations concerning board independence and board size we identify, in accordance with the existing literature, a main set of variables that we describe below.

A. Scope of operations

The expression "scope of operations" refers to the nature, diversity and complexity of the firm's business production process (Boone et al., 2007). To capture the different aspects of the scope of operations, previous studies have used several proxies for it, such as firm size, age, leverage and the number of business segments involved (e.g., Boone et al., 2007; Coles et al., 2008; Linck et al., 2008; Pathan, 2009). For instance, Coles et al. (2008, p. 351) argue that "*complex firms such as those that are diversified across industries, large in size, or have high leverage are likely to have greater advising requirements. Hence, these firms are more likely to benefit from a larger board of directors, particularly from outside directors who possess relevant experience and expertise*."

A.1 Bank size

As the benefits of monitoring increase, boards will do more monitoring, leading to more outsiders on the board (Linck et al., 2008). Since independent directors are presumably better monitors and the potential for agency conflicts is expected to increase with firm size, large firms could require more of such directors in order to diminish the augmented agency problems of being large (Lehn et al., 2009). On the one hand, outside directors bring expertise, experience and potentially important connections to the firm and therefore, they are of high importance to large firms (Coles et al., 2008; Linck et al., 2008). On the other hand, an in-depth knowledge of the firm is particularly important for larger firms, namely in advising managers concerning the firm's business strategy. Following this view, inside directors are likely to play an important role as they have a broad and detailed knowledge of the internal workings of the firm, its strengths, weaknesses and constraints. In addition to board independence, firm size can also affect

board size. Larger or more diverse firms may require more new board members to serve on their board committees, (Boone et al., 2007). In the same way, the information requirements of larger and more complex firms generally result in the need for larger boards (Pathan and Skully, 2010). Due to the higher volume and greater diversity of activities, larger firms have more demand for information than their smaller counterparts (Lehn et al., 2009). As firms grow, boards grow in response to the increasing net benefits of monitoring and specialisation by board members (Boone et al., 2007), as well as to the increased gains of advising. So, we expect a positive relationship between bank size and board size. Previous studies (e.g., Denis and Sarin, 1999; Lasfer, 2006; Boone et al., 2007; Coles et al., 2008; Guest, 2008; Linck et al., 2008; Belkhir, 2009; Lehn et al., 2009) have established a positive relationship between firm size and, respectively, board size and board independence. However, according to the existing arguments the impact of bank size on board independence is not, *a priori*, completely clear. On the one hand, since larger firms require more managerial effort and more diverse expertise, they will have more independent directors. On the other hand, as larger firms require a broad knowledge regarding their multiple specificities (internal policies, strategies, etc) and complexities, and being inside directors an important source of firm-specific information (Raheja, 2005), then larger firms will have more inside directors. As Lasfer (2006), Boone et al. (2007) and Lehn et al. (2009) the size of the bank (*Bank size*) is measured as the natural logarithm of market capitalisation.

A.2 Bank capital, bank age and bank diversification

Empirical studies, such as Boone et al. (2007), Coles et al. (2008), Guest (2008) and Linck et al. (2008) suggest that board size and independence are positively associated with leverage, firm age, and diversification. These findings reflect the idea that firms with higher financial leverage, greater age and higher diversification are more complex, thereby demanding more experience and skills, as well as greater advisory requirements (e.g., Fama and Jensen, 1983; Coles et al., 2008; Guest, 2008).

Firms with high leverage depend significantly on external resources and may have

greater needs for advice (Pfeffer, 1972; Klein, 1998). A larger board and a higher proportion of outsiders can provide greater information and, therefore, both should increase as the advisory needs increase (Guest, 2008). Consistent with this view, Pfeffer (1972) finds that firms with greater needs for access to external capital have a higher number of directors and a higher percentage of outside members on their boards. However, Pathan and Skully (2010) find a positive relationship between board size and bank capital and Chen and Al-Najjar (2012) find no significant association between board size and non-financial firm leverage. Moreover, bank capital may positively affect board independence because a high capital ratio means a lower level of debt. Debt is considered to be an important market monitoring mechanism in disciplining bank managers (Flannery, 1998). Thus, given the lack of such monitoring mechanism, other internal governance devices, such as independent directors, may become more important (Pathan and Skully, 2010).

Also, we account for the age of the bank. As time passes (banks become older and more established), managers are promoted to directors, increasing board size (Mak and Li, 2001). Accordingly, a positive relationship between board size and bank age is expected. However, for Mak and Li (2001), Hillier and McColgan (2006) and Pathan and Skully (2010), firm age is not significantly associated with board size.

Furthermore, we account for diversification. Previous studies such as Boone et al. (2007), Linck et al. (2008) and Lehn et al. (2009) use the number of business segments as a measure of diversification for non-bank firms and Mak and Li (2001) use the percentage of subsidiaries and associates for financial and non-financial firms. However, for banks we use the primary measure of revenue diversification proposed by Stiroh and Rumble (2006), which "*seemed more appropriate because it captures the complexity and the level of diversification of banks through their income sources*" (Pathan and Skully, 2010, p. 1594). For instance, Mak and Li (2001) predict that diversified firms will have larger boards because of the need for more directors with expertise in different areas of business and Pathan and Skully (2010) also find that bank diversification increases bank board size but not board independence.

Similarly to Pathan and Skully (2010), we measure bank capital (*Capital*), as the ratio of total equity to total assets. The age of the bank (*Bank age)*, as Guest (2008) and Pathan and Skully (2010) is measured as the number of years since the bank was first

listed on Datastream. Finally, regarding bank diversification (*Diversification*), we use a measure of revenue diversification by Stiroh and Rumble (2006) which is calculated as 1- (squared share of net operating revenue from net interest sources plus squared share of net operating revenue from non-interest sources). A higher value indicates a more diversified mix: 0.0 means that all revenue comes from a single source (complete concentration), while 0.5 is an even split between net interest income and non-interest income (complete diversification).

B. Growth opportunities

The information asymmetry associated with high-growth firms is expected to affect board composition (Mak and Roush, 2000). It can be argued that firms with more future growth opportunities may have more outside directors on the board to control the higher agency problems inherent in such firms (Bathala and Rao, 1995). In other words, to mitigate the potential agency problems associated with high growth firms, one might expect to find greater representation of outside directors on the boards of these firms. Consistent with this argument, Mak and Roush (2000) show that the proportion of outside directors is positively related to the extent of growth opportunities available to a firm. On the other hand, information asymmetry impairs the ability of outside directors to fulfil their advisory function in high growth firms (Lehn et al., 2009). Either the outside directors make decisions based on less information than their peers in low growth firms, or they incur in higher costs when obtaining information to enable them to make more informed decisions. In addition, as the outside directors serve a monitoring function, the CEO may have an incentive to hide certain types of information. These arguments support an inverse relationship between growth opportunities and the proportion of independent directors. In accordance, Linck et al. (2008) find that firms with high growth opportunities are associated with less independent boards. Board size is also likely to be affected by the firm's growth opportunities. The costs of monitoring managers increase with a firm's growth opportunities (Smith and Watts, 1992). Consequently, the free rider problem of large boards is more pronounced in high growth firms (Lasfer, 2006; Lehn et al., 2009). In

order for board members to have enough incentive to bear the high monitoring costs in firms with high growth opportunities, boards are expected to have a small size (Lehn et al., 2009). In addition, Lehn et al. (2009) argue that, since high growth firms operate in more volatile environments than low growth firms, they require board structures that facilitate rapid decision-making and redeployment of assets. Thus, the more volatile the environment in which a firm operates, the smaller its board is likely to be. Growth firms may find it important to have boards that can make timely strategic decisions and such firms may, therefore, prefer smaller boards (Mak and Roush, 2000). For Mak and Roush (2000) there is some evidence that firms expected to have more growth opportunities tend to employ smaller boards. Similarly, Linck et al. (2008) find that firms with high growth opportunities are associated with smaller boards as do Lehn et al. (2009) when using the market-to-book value of assets ratio as a proxy for growth opportunities. We use the market-to-book ratio to measure growth opportunities (*Growth opportunities*).

C. CEO characteristics

Board independence decreases with the CEO's bargaining power (Hermalin and Weisbach, 1998; Baker and Gompers, 2003) and such CEO power derives from his/her perceived ability, relative to a replacement (Hermalin and Weisbach, 1998), to influence board decisions. The findings of Hermalin and Weisbach (1998) suggest that board independence will decline over the course of the CEO's tenure. Keeping his/her job for a long period of time gives the CEO bargaining power vis-à-vis the directors. Therefore, he/she is able to pressure for a board that is more favourable to him/her and so more insiders are placed in board positions. Instead, "*a new CEO is an unknown quantity with relatively less power than an established CEO. Consequently, shareholders feel that a new CEO requires more scrutiny, so they will put more outsiders on the board to monitor him. In addition, shareholders are better able to put monitors on the board because the new CEO is not yet powerful enough to keep them off*" (Hermalin and Weisbach, 1988, p. 605). Furthermore, the longer the CEO has been with the firm, the more entrenched that person is likely to be. This entrenchment derives from the fact that

over time, CEOs can influence the composition of their boards through the director nomination process (Mallette and Fowler, 1992). Other existing literature such as Bathala and Rao (1995) finds a negative association between CEO tenure and board independence, indicating that the longer a CEO has held this position, the greater the influence he/she has to change the board into a more favourable one with insiders. However, Pathan and Skully (2010) find that the coefficient on the CEO tenure variable is not statistically significant in their board independence regression. *CEO tenure* is measured as the number of years the CEO has served in this position.

Board independence can also be affected by the CEO succession process (Hermalin and Weisbach, 1988; Linck et al., 2008). Although, for Hermalin and Weisbach (1988) as a CEO nears retirement firms tend to add insiders to the board, for Pathan and Skully (2010) there is no significant relationship between CEO age, proxy for CEO succession planning, and board independence. Similarly to Linck et al. (2008) and Pathan and Skully (2010), *CEO age* is measured as the length of time to retirement.

4.3.4 Empirical framework

The regression Equation (4.1) shown below is formulated to test empirically the main hypotheses, H_1 to H_5, given the literature discussion in Section 4.2. In this paper we intend to analyse whether bank risk-taking and the efficacy of governance mechanisms are contingent upon environmental circumstances: crisis and non-crisis periods. So, we test the hypotheses for two different economic contexts: during the financial crisis and before the financial crisis. First, the equation is regressed in a recession period, using data for 2007 and 2008 and second, the equation is regressed in a "normal" period using data for 2006. In the former case, except for dummies, the independent variables are averaged over the period. Thus, for the crisis period each sample bank has only one observation.

As it is possible that not only board independence and board size may influence bank risk, but also that bank risk may influence these board characteristics,[68] we use a

[68] The relationship can then be bi-directional and accordingly the variables will be determined simultaneously.

simultaneous equations approach. This way, we take into account the interdependencies between risk and board characteristics. In terms of methodology we develop a system of simultaneous equations in which bank risk, board independence and board size are endogenised. So, we estimate three equations in the system, one for each endogenous variable. Equations (4.2) and (4.3) relate, respectively, to board independence and board size.

The three regression equations are:

$$\begin{aligned}(Bank\ risk)_{i,t} \;=\; & \beta_0 + \beta_1(Board\ independence)_{i,t} + \beta_2(Board\ size)_{i,t} + \\ & + \beta_3(CEO\ power)_{i,t} + \beta_4(Institutional\ ownership)_{i,t} + \\ & + \beta_5(Risk\ committee)_{i,t} + \beta_6(CRO)_{i,t} + \beta_7(Chair\ ex\_CEO)_{i,t} + \\ & + \beta_8(Performance)_{i,t-1} + \beta_9(Bank\ size)_{i,t} + \\ & + \beta_{10}(Capital)_{i,t} + \beta_{11}(Growth\ opportunities)_{i,t} + \\ & + \sum_{j=1}^{n} \beta_{(11+j)}(DCountry)_{ji,t} + \varepsilon_{i,t} \end{aligned} \tag{4.1}$$

$$\begin{aligned}(Board\ independence)_{i,t} \;=\; & \beta_0 + \beta_1(Board\ size)_{i,t} + \beta_2(Bank\ risk)_{i,t} + \\ & + \beta_3(Bank\ size)_{i,t} + \beta_4(Capital)_{i,t} + \\ & + \beta_5(Diversification)_{i,t} + \\ & + \beta_6(Growth\ opportunities)_{i,t} + \beta_7(CEO\ tenure)_{i,t} + \\ & + \beta_8(CEO\ age)_{i,t} + \\ & + \sum_{j=1}^{n} \beta_{(8+j)}(DCountry)_{ji,t} + \varepsilon_{i,t} \end{aligned} \tag{4.2}$$

$$\begin{aligned}(Board\ size)_{i,t} \;=\; & \beta_0 + \beta_1(Board\ independence)_{i,t} + \beta_2(Bank\ risk)_{i,t} + \\ & + \beta_3(Bank\ size)_{i,t} + \beta_4(Capital)_{i,t} + \beta_5(Bank\ age)_{i,t} + \\ & + \beta_6(Diversification)_{i,t} + \beta_7(Growth\ opportunities)_{i,t} + \\ & + \sum_{j=1}^{n} \beta_{(7+j)}(DCountry)_{ji,t} + \varepsilon_{i,t} \end{aligned} \tag{4.3}$$

where, i is the index of the i^{th} bank, t is the time period, n is the number of country dummies and $\varepsilon_{i,t}$ is the error term. $DCountry$ are the country dummies indicating the country of the bank.

For a detailed definition of the variables please see sub-section 4.3.2 and Appendix 4.1.

To estimate the system of simultaneous equations, we employ the 3SLS estimation method and, as a robustness test, the 2SLS estimation method.[69] The Ordinary Least Squares (OLS) estimates of the parameters of the equations with endogenous variables on the right-hand side are biased and inconsistent, a problem usually referred to as "the simultaneous equation bias".[70] Also, we take into account the heteroscedasticity issue.

The endogenous variables in our system of equations are *Bank risk, Board independence* and *Board size*. Under our system of equations, these variables are dependent on each other, and also on other exogenous variables. In estimating the system of equations, we use the exogenous variables as instruments.

According to the order condition "*In a model of M simultaneous equations in order for an equation to be identified, it must exclude at least M-1 variables (endogenous as well as predetermined) appearing in the model. If it excludes exactly M-1 variables, the equation is just identified. If it excludes more than M-1 variables, it is overidentified*" (Gujarati, 2004, p. 748). In our model, in order to satisfy the order, each equation must exclude at least two of the exogenous variables. It can be verified that it is the case with our model.

[69] Also, as a robustness test we use 3SLS estimation method, with all variables winsorised at the 1st and 99th percentile. See, please, sub-section 4.4.3.2.

[70] OLS estimation of an equation that contains an endogenous explanatory variable generally produces biased and inconsistent estimators (Wooldridge, 2012).

4.4 Empirical results

In this section we first present and analyse the directors on the board and the Pearson correlation matrix. Then, we present and discuss the estimation results using the 3SLS estimation method, in the crisis period and in the non-crisis period.

4.4.1 Descriptive statistics and correlation matrix

Table 4.1 presents the descriptive statistics for the various board structure, ownership, CEO characteristics and bank-specific variables in the crisis period, with the exception of the *Performance* variable, which measures past performance (year 2006).

Table 4.1 – Descriptive statistics

The table reports the descriptive statistics of each variable by showing mean, median, standard deviation (Std. dev.), maximum (Max.) and minimum (Min.).

Variable	# Obs.	Mean	Median	Std. dev.	Max.	Min.
Panel A: Board structure variables						
Board independence (%)	72	41.468	47.078	26.796	92.308	0.000
Board size (Nº)	72	16.472	15.000	6.015	34.000	6.000
CRO	72	0.056	0.000	0.231	1.000	0.000
Chair ex_CEO	72	0.250	0.000	0.436	1.000	0.000
Panel B: Ownership structure variable						
Institutional ownership (%)	69	49.600	48.485	24.993	99.015	0.050
Panel C: CEO characteristics variables						
CEO power	72	0.056	0.000	0.231	1.000	0.000
CEO tenure (years)	72	5.040	3.500	4.843	27.400	0.3500
CEO age (years)	72	53.924	54.250	8.110	77.500	33.500
Panel D: Bank-specific variables						
Bank risk (%)	72	3.315	3.018	1.484	9.100	0.541
Risk committee	72	0.403	0.000	0.494	1.000	0.000
Performance (%)	72	25.072	20.836	19.611	93.981	-29.251
Bank size (€ bil.)	72	14.185	7.421	19.107	109.975	0.236
Capital (%)	72	5.694	4.699	4.478	34.936	1.501
Bank age (years)	72	21.507	20.489	11.112	43.500	2.733
Diversification	72	0.420	0.452	0.083	0.499	0.103
Growth opportunities (%)	72	133.871	125.129	67.058	480.742	45.080

Note: Observations vary because of missing data.

Please refer to Appendix 4.1 for the definition of each variable.

The board structure variables in Panel A of Table 4.1 show that the mean (median) percentage of independent directors is 41.468% (47.078%) with a minimum of 0%, meaning that in this case all the directors are non-independent, and a maximum of 92.308%. The mean (median) number of bank board directors is 16.472, with a minimum of 6.000 directors and a maximum of 34.000 directors. Only 5.6% of the CROs in our sample of banks are a board member and 25% of the current Chairmen have previously occupied the position of CEO.

Regarding the ownership structure variable, in Panel B of Table 4.1, the mean (median) value of institutional ownership is 49.600% (48.485%).

In Panel C of Table 4.1, the descriptive statistics of the CEO characteristics variables indicate that only 5.6% of the CEOs in our sample of banks also serve as Chairman of the board, which is greater than what is reported by McNulty et al. (2013), 4.95%, in a sample of non-financial firms and much lower than the percentage shown by Lewellyn and Muller-Kahle (2012), 73%, in a sample of financial firms. The mean (median) tenure of the CEO is 5.040 years (3.500 years). Therefore, on average, the CEO served 5.040 years in this position, which is below the value reported by Bathala and Rao (1995), 10.53 years, and Pathan and Skully (2010), 8.85 years. In addition, the mean (median) age of the CEO is 53.924 years (54.250 years) and the oldest CEO is 77.500 years old.

Finally, Panel D of Table 4.1 presents the descriptive statistics of the bank-specific characteristics variables. Concerning the descriptive statistics of the bank risk measure the mean (median) is 3.315% (3.018%). In our sample 40.3% of the banks have a risk committee. The mean (median) past performance, is 25.072% (20.836%), reaching a negative minimum value of -29.251%. The sample mean (median) bank size is €14.185 billion (€7.421 billion) and the mean (median) capital ratio is 5.694% (4.699%), a value below the limits imposed under the Basel III framework.[71/72] The mean (median) bank age is 21.507 years (20.489 years), with a minimum of 2.733 years ans a maximum of 43.500 years. Finally, the mean (median) diversification is 0.420 (0.452), reaching a maximum value of 0.499 (near complete diversification), and the mean (median) growth opportunities is 133.871% (125.129%).

Table 4.2 presents the Pearson correlation matrix for all the variables. Due to the problem of space, given the number of variables, we present the correlation matrix in three different panels, calculated for the common observations (N=69). Panel A presents the correlation between the variables used in Equation (4.1), Panel B presents the correlation between the variables used in Equation (4.2) and Panel C presents the correlation between the variables used in Equation (4.3). We note that since some variables appear in more than one equation, their correlation is presented in more than one Panel.

[71] We note that, following previous studies, we use a non-risk-weighted capital ratio (a simple measure a capital), while in the Basel framework the focus is on risk-weighted capital measures.
[72] With emergence of the Basel III regulators seek to increase both the quality and the quantity of banks' capital (Moussu and Petitromec, 2013).

Table 4.2 – Pearson correlation matrix

Panel A:

	Variables	1	2	3	4	5	6	7	8	9	10	11	12
1	Bank risk	1.000											
2	Board independence	0.313***	1.000										
3	Board size	0.020	-0.235*	1.000									
4	CEO power	-0.084	-0.043	-0.061	1.000								
5	Institutional ownership	0.015	-0.024	0.175	-0.350***	1.000							
6	Risk committee	0.235*	0.114	0.088	0.048	0.118	1.000						
7	CRO	0.023	-0.025	0.164	-0.053	0.134	0.258**	1.000					
8	Chair ex_CEO	-0.003	0.116	-0.088	0.146	0.003	0.075	-0.122	1.000				
9	Performance	-0.043	-0.174	0.066	-0.033	-0.001	-0.058	-0.006	-0.124	1.000			
10	Bank size	0.358***	0.369***	0.353***	0.070	-0.140	0.239**	0.105	-0.098	-0.100	1.000		
11	Capital	-0.247**	0.043	-0.253**	0.046	-0.127	-0.155	-0.115	0.034	0.090	-0.210	1.000	
12	Growth opportunities	-0.268**	-0.091	-0.299**	0.174	-0.188	-0.095	-0.040	0.096	0.151	-0.176	-0.027	1.000

Asterisks indicate significance at the 1% (***), 5% (**) and 10% (*), using a two-tailed test. Please refer to Appendix 4.1 for the definition of each variable.

Table 4.2 – Pearson correlation matrix *(cont.)*

Panel B:

	Variables	1	2	3	10	11	12	13	14	15
1	Bank risk	1.000								
2	Board independence	0.313***	1.000							
3	Board size	0.020	-0.235*	1.000						
10	Bank size	0.358***	0.369***	0.353***	1.000					
11	Capital	-0.247**	0.043	-0.253**	-0.210	1.000				
12	Growth opportunities	-0.268**	-0.091	-0.299**	-0.176	-0.027	1.000			
13	Diversification	0.153	0.183	0.187	0.290**	-0.399***	-0.069	1.000		
14	CEO tenure	-0.233*	-0.281**	0.017	-0.163	0.035	0.092	-0.032	1.000	
15	CEO age	-0.077	-0.233*	0.210*	0.215*	-0.034	-0.198	-0.028	0.381***	1.000

Asterisks indicate significance at the 1% (***), 5% (**) and 10% (*), using a two-tailed test. Please refer to Appendix 4.1 for the definition of each variable.

Table 4.2 – Pearson correlation matrix *(cont.)*

Panel C:

	Variables	1	2	3	10	11	12	13	16
1	Bank risk	1.000							
2	Board independence	0.313***	1.000						
3	Board size	0.020	-0.235*	1.000					
10	Bank size	0.358***	0.369***	0.353***	1.000				
11	Capital	-0.247**	0.043	-0.253**	-0.210	1.000			
12	Growth opportunities	-0.268**	-0.091	-0.299**	-0.176	-0.027	1.000		
13	Diversification	0.153	0.183	0.187	0.290**	-0.399***	-0.069	1.000	
16	Bank age	0.360***	0.255**	0.109	0.303**	-0.117	-0.146	0.157	1.000

Asterisks indicate significance at the 1% (***), 5% (**) and 10% (*), using a two-tailed test. Please refer to Appendix 4.1 for the definition of each variable.

Multicollinearity among the variables should not be a concern as the maximum value of the correlation coefficient is, in absolute value, 0.399. This is, below the threshold of 0.8 beyond which multicollinearity is considered a problem (e.g., Gujarati, 2004). Correlation between variables is considered undesirable for multivariate analysis if the value exceeds 0.8.[73]

4.4.2 3SLS estimation results

In this sub-section we first present and analyse the 3SLS estimation results in the crisis period (Table 4.3).

Additionally, we test whether the impact of the determinants of bank risk and board structure depends on environmental conditions and therefore, whether the effect of such determinants is different in crisis and non-crisis periods. Thus, we then present 3SLS estimation results in the non-crisis period (Table 4.4).

4.4.2.1 3SLS in the crisis period

Table 4.3 reports the 3SLS estimates of the system of the three regression equations, that is, Equations (4.1) to (4.3) for *Bank risk*, *Board independence* and *Board size* respectively.

[73] As a rule-of-thumb, multicollinearity is considered harmful only when the correlation between two regressors exceed 0.8 (e.g., Gujarati, 2004).

Table 4.3 – Determinants of bank risk-taking in the crisis period – 3SLS

The table presents 3SLS regression results of bank risk-taking and board structure in the financial crisis.

Variable	**(1)**	**(2)**	**(3)**
	Bank risk	**Board independence**	**Board size**
Bank risk	---	4.928**	-0.230
		(0.024)	(0.197)
Board independence	-0.013*	---	0.049***
	(0.058)		(0.000)
Board size	-0.340***	15.597***	---
	(0.002)	(0.000)	
CEO power	-2.277*	---	---
	(0.065)		
Institutional ownership	0.017**	---	---
	(0.014)		
Risk committee	0.201	---	---
	(0.609)		
CRO	-1.671	---	---
	(0.564)		
Chair ex_CEO	2.214***	---	---
	(0.000)		
Performance	-0.018*	---	---
	(0.083)		
Bank size	1.585***	-42.560***	2.460***
	(0.000)	(0.000)	(0.000)

Table 4.3 – Determinants of bank risk-taking in the crisis period – 3SLS *(cont.)*

The table presents 3SLS regression results of bank risk-taking and board structure in the financial crisis.

Variable	**(1)**	**(2)**	**(3)**
	Bank risk	**Board independence**	**Board size**
Capital	-0.159*	6.194***	-0.377***
	(0.067)	(0.000)	(0.000)
Growth opportunities	-0.003	0.312***	-0.017***
	(0.192)	(0.000)	(0.000)
Bank age	---	---	0.032
			(0.322)
Diversification	---	-177.470***	11.654***
		(0.000)	(0.000)
CEO tenure	---	-1.351**	---
		(0.047)	
CEO age	---	0.765*	---
		(0.053)	
Country dummies	Yes	Yes	Yes
N	69	69	69
Adj-R^2	0.937	0.864	0.989

The p-values of coefficient significance are in brackets and asterisks indicate significance at the 1% (***), 5% (**) and 10% (*) levels, using a two-tailed test. Please refer to Appendix 4.1 for the definition of each variable.

Column (1), in Table 4.3, presents the 3SLS estimates of regression Equation (4.1), when *Bank risk* is the dependent variable. During the financial crisis we find evidence that higher proportion of independent directors leads to lower levels of bank risk-taking, as the coefficient on the *Board independence* variable is negative and statistically significant, supporting hypothesis H_1. A reason that may explain this result is that independent directors are more sensitive to the regulatory requirements and consequently take more prudent, moderate and conservative actions, thereby influencing bank managers actions, in order to avoid loss of professional reputation and even lawsuits in the event of large scale destruction of shareholder value resulting from lax monitoring. Therefore, they are particularly careful in carrying out the monitoring role. This result is consistent with Pathan (2009) and Ferrero-Ferrero et al. (2012) for the crisis period.

With regard to the size of the board, the coefficient on the *Board size* variable is also negative and statistically significant. Therefore, as hypothesised, a small board is associated with more bank risk-taking or, in other words, associated with more variability of bank performance. This result is in accordance with previous studies related to group decision-making process, which argue that larger groups tend to make less extreme decisions. Also, a larger board facilitates monitoring and advising by managers due to the additional human capital available. This finding is also consistent with several previous studies such as Cheng (2008), Pathan (2009), Ferrero-Ferrero et al. (2012) in an economic growth period, Nakano and Nguyen (2012), Wang (2012) and Huang and Wang (2015) and it confirms hypothesis H_2.

As expected, the coefficient on the *CEO power* variable is negative and statistically significant. Thus, a powerful CEO decreases bank risk-taking, supporting hypothesis H_3. This may be because as managers are risk averse they have less incentive to take risk. To safeguard their non-diversifiable wealth they are not inclined to invest in riskier projects. Additionally, whenever his/her remuneration is not linked to risk-taking (fixed compensation) the CEO prefers safer projects.

With respect to ownership structure, the coefficient on the *Institutional ownership* variable is positive and so, we find that institutional investors increase bank risk-taking, thus confirming hypothesis H_4. This finding is supported by the argument that such investors encourage managers to take more risk in order to increase bank value and

consequently, their own wealth. The focus of institutional ownership on short-term profitability encourages bank risk-taking.

Contrary to the expectation, neither the coefficient on the *Risk committee* variable nor the coefficient on the *CRO* variable are statistically significant. Although following the financial crisis, the existence of a separate risk committee and the presence of a CRO on the board were commonly recommended, we do not find evidence that these risk governance mechanisms influence bank risk-taking and so, hypothesis H_5 is not confirmed. The reasons that may explain this finding are that, on the one hand, "*even though most large banks had a dedicated risk committee, most of them met very infrequently*" (Aebi et al., 2012, p. 3214) and, on the other hand, most risk committees may not be comprised of a sufficient number of independent and financially knowledgeable/experienced members who know how to implement appropriate risk management strategies, resulting in a failure of risk management at banks.[74]

The coefficients on the other bank characteristics also offer important insights. As expected, the coefficient on the *Chair ex_CEO* variable is positive and statistically significant, meaning that banks in which the Chairman has previously served as CEO take more risk. Holding a management position at the bank negatively interferes with the current duties and responsibilities as Chairman. In accordance with the expectation, the statistically significant negative coefficient on the *Performance* variable, which measures past performance, demonstrates that bank risk-taking increases following poor performance. The coefficient on the *Bank size* variable is positive and statistically significant, suggesting that bank size is associated with more risk-taking. Additionally, the statistically significant negative coefficient on the *Capital* variable indicates that highly capitalised banks observe less performance variability. Finally, the coefficient on the *Growth opportunities* variable is not statistically significant and so, this variable has no predictive power in explaining bank risk-taking.

Column (2), in Table 4.3, presents the 3SLS estimates of regression Equation (4.2), when *Board independence* is the dependent variable. Specifically, we find that board independence increases as bank risk-taking increases. Increased risk

[74] Stulz (2008) characterises a failure of risk management as one of the following: failure to identify and measure risks, failure to communicate effectively risk exposures, providing timely information to the board and top management and failure to monitor and manage risks.

leads to increased independent directors, which in turn lead to a decline in bank risk-taking (see Column (1) in Table 4.3). In other words, as risk rises banks are encouraged to include more independent directors given that more independent boards originate less risk-taking. Also, as the board becomes larger board independence increases. On the contrary, bank size negatively impacts on board independence suggesting that larger banks demand more inside directors because their large size requires more specific information (and so, the inclusion of insiders can lead to more effective decision making), although it gives rise to more significant agency problems (Lehn et al., 2009). Similarly, Berry et al. (2006) find that firm size is also negatively related to board independence, showing that as firms get larger outside board representation declines. As expected, bank capital positively affects board independence. High capital ratio implies low debt ratio and with debt being a market monitoring device, in the absence (scarcity) of this mechanism, board independence works as a substitute control mechanism and so, it increases. Similarly, growth opportunities have a positive impact on board independence. This finding provide support for the argument that firms with greater agency problems, related to growth opportunities, are likely to choose boards of directors that are more effective at mitigating such problems. Lastly, with respect to bank specific characteristics, we find that bank diversification is negatively related to board independence. The direction of this relationship is consistent, for example, with Pathan and Skully (2010), however they do not find statistical significance. Regarding the CEO characteristics, the significant negative coefficient on the *CEO tenure* variable indicates that as the length of time during which the CEO has served as CEO increases, the proportion of independent directors decreases. This result is consistent not only with the bargaining/negotiation hypothesis, which predicts that board independence is negatively related to CEO tenure (a measure of the CEO's influence), but also with the entrenchment theory. The longer the tenure of a firm's CEO, the more entrenched he/she is likely to be. Finally, at odds with the expectation, the coefficient on the *CEO age* variable is positive and statistically significant. Thus, as a CEO approaches retirement banks add independent directors to the board. A potential explanation for this unexpected result is that as the CEO approaches retirement there is a loss of power on his/her part and shareholders may, in that case, be more readily able to impose additional independent members on the board, thus signalling a future change in the

strategy (Rosenstein and Wyatt, 1990) and perhaps intending to engage such members more intensely in succession planning activities at the board level.

Column (3), in Table 4.3, reports the results of the 3SLS estimates of regression Equation (4.3), when *Board size* is the dependent variable. More precisely, we find that neither the coefficient on the *Bank risk* variable nor the coefficient on the *Bank age* variable are statistically significant. Consistent with Mak and Li (2001), Hillier and McColgan (2006), Guest (2008) and Pathan and Skully (2010) respectively, in a sample of non-financial firms and banks, firm age has no impact on explaining board size. The coefficient on the *Board independence* variable is positive and statistically significant and so, as the proportion of independent directors increases the board becomes larger. Also, the coefficient on the *Bank size* variable is positive and statistically significant providing support for the hypothesis that larger banks have larger boards. This result is consistent with Baker and Gompers (2003), Boone et al. (2007), Coles et al. (2008), Guest (2008), Linck et al. (2008), Lehn et al. (2009) and Pathan and Skully (2010). Furthermore, both the coefficients on the *Capital* and *Growth opportunities* variables are negative and statistically significant, at 1%. Thus, banks with high capital ratios are associated with smaller boards, which is in accordance with previous studies that show a positive relationship between debt and board size (Guest, 2008; Linck et al., 2008). Also, banks with high growth opportunities have smaller boards, which facilitate faster and timely decisions. This result confirms the view that firms with high growth opportunities generally require more agile governance structures. Finally, the positive and statistically significant coefficient on the *Diversification* variable indicates that diversified banks have larger boards (e.g., Pathan and Skully, 2010).

4.4.2.2 3SLS in the non-crisis period

We repeat the estimation of Equations (4.1) to (4.3) as specified in sub-section 4.3.4 for the non-crisis period. Table 4.4 reports the results.

Table 4.4 – Determinants of bank risk-taking in the non-crisis period – 3SLS

The table presents 3SLS regression results of bank risk-taking and board structure in the non-crisis period (2006).

Variable	**(1)**	**(2)**	**(3)**
	Bank risk	**Board independence**	**Board size**
Bank risk	---	16.529*	-2.576***
		(0.060)	(0.003)
Board independence	-0.004**	---	0.111***
	(0.030)		(0.000)
Board size	-0.018	3.503*	---
	(0.321)	(0.066)	
CEO power	0.128	---	---
	(0.559)		
Institutional ownership	0.011***	---	---
	(0.000)		
Risk committee	-0.092	---	---
	(0.430)		
CRO	-0.288	---	---
	(0.672)		
Chair ex_CEO	-0.400***	---	---
	(0.005)		
Performance	0.023***	---	---
	(0.000)		
Bank size	0.049	-2.179	0.894**
	(0.163)	(0.468)	(0.025)

Table 4.4 – Determinants of bank risk-taking in the non-crisis period – 3SLS *(cont.)*

The table presents 3SLS regression results of bank risk-taking and board structure in the non-crisis period (2006).

Variable	**(1)**	**(2)**	**(3)**
	Bank risk	**Board independence**	**Board size**
Capital	-0.019	-5.449***	0.434***
	(0.405)	(0.000)	(0.006)
Growth opportunities	0.001	0.070***	-0.008***
	(0.604)	(0.002)	(0.002)
Bank age	---	---	0.109***
			(0.002)
Diversification	---	-102.960***	19.333***
		(0.000)	(0.000)
CEO tenure	---	-1.058*	---
		(0.092)	
CEO age	---	0.473	---
		(0.332)	
Country dummies	Yes	Yes	Yes
N	67	67	67
Adj-R^2	0.990	0.963	0.984

The p-values of coefficient significance are in brackets and asterisks indicate significance at the 1% (***), 5% (**) and 10% (*) levels, using a two-tailed test. Please refer to Appendix 4.1 for the definition of each variable.

Column (1), in Table 4.4, presents the 3SLS estimates of regression Equation (4.1), in the non-crisis period, and we find differences from the results reported in Column (1), in Table 4.3, in the crisis period. In particular, regarding our main variables, both the coefficients on the *Board size* and *CEO power* variables are not statistically significant and so, neither the size of the board nor a powerful CEO affect bank risk-taking in the non-crisis period (proxy to "normal" periods). In a non-recession period, the advantages of larger boards in minimising risk do not seem to be relevant. Board decisions in such period involve less uncertainty and are more predictable. In this sense, the macroeconomic stability produces less performance variability. Also, bank risk is not influenced by leadership power. The risk-averse behaviour of bank managers, which encourages them to take less risk, become insignificant in the presence of more favourable macroeconomic conditions. In short, the impact of these governance mechanisms on risk-taking reduction disappears in a non-crisis period. Regarding the control variables, both the coefficients on the *Chair ex_CEO* and *Performance* variables maintain their statistical significance but change sign. So, their impact in bank risk-taking in a non-recession period is exactly the opposite of that in a crisis period. Additionally, we note that the positive coefficient on the *Bank size* variable and the negative coefficient on the *Capital* variable are now not statistically significant and thus, both the size and capital of the bank have no impact on bank risk in the non-crisis period. Taken together, our findings indicate that some governance mechanisms (and other control variables) are helpful in crisis conditions but not in stable conditions and thus, their effect seems to be contingent upon macroeconomic conditions.

Column (2), in Table 4.4, presents the 3SLS estimates of regression Equation (4.2), in the non-crisis period, and we also find deviations from the results reported in Column (2), in Table 4.3, in the crisis period. Both the coefficients on the *Bank size* and *CEO age* variables are no longer statistically significant. Consequently, neither the size of the bank nor the age of the CEO have an influence on board independence in the non-crisis period. Furthermore, the coefficient on the *Capital* variable is still statistically significant but is now negative. In a stable period perhaps banks are less concerned about board vigilance carried out by independent directors. Thus, despite the increase in capital implying a relative decrease of debt and a decrease in its monitoring role, the proportion of independent directors also decreases.

Column (3), in Table 4.4, reports the 3SLS estimates of regression Equation (4.3), in the non-crisis period, and we also detect deviations from the results reported in Column (3), in Table 4.3, in the crisis period. Both the coefficients on the *Bank risk* and the *Bank age* variables are now statistically significant. Therefore, both bank risk-taking and bank age influence board size in the non-crisis period. For instance, as banks become older, more directors join the board and as result boards become larger (Mak and Li, 2001). Additionally, the coefficient on the *Capital* variable remains statistically significant but is now positive, consistent with Pathan and Skully (2010).

Replicating our analysis in a non-crisis period, we are able to show that the influence of some governance mechanisms and other factors on bank risk-taking have different effects in stable and crisis conditions. Thus, such influence depends on the macroeconomic environment.

4.4.3 Robustness checks

We now perform additional tests to check the robustness of the previous results, in the crisis and non-crisis periods. These tests include, first, the estimation of the Equations (4.1) to (4.3) in a simultaneous system using the 2SLS estimation method. Second, to account for the (potential) effect of outliers, winsorisation was performed on all variables.

Given that Equation (4.1), *Bank risk* equation, is the main equation and in order to save on space we only present the findings regarding bank risk-taking. Thus, the estimation results of Equations (4.2) and (4.3), *Board independence* and *Board size*, respectively, are not reported, they are nevertheless available upon request.

4.4.3.1 2SLS in the crisis and non-crisis periods

Estimation results of Equation (4.1) using 2SLS in the crisis and non-crisis period are shown in Table 4.5, respectively, in Columns (1) and (2).

Table 4.5 – Determinants of bank risk-taking in the crisis period and non-crisis period – 2SLS

The table presents 2SLS regression results of bank risk-taking in the financial crisis and before the financial crisis (2006).

Variable	(1) Bank risk (crisis period)	(2) Bank risk (non-crisis period)
Board independence	-0.016**	-0.004**
	(0.048)	(0.039)
Board size	-0.360***	-0.019
	(0.003)	(0.351)
CEO power	-1.753	0.201
	(0.216)	(0.420)
Institutional ownership	0.024***	0.011***
	(0.002)	(0.000)
Risk committee	0.164	-0.101
	(0.707)	(0.440)
CRO	-1.444	-0.322
	(0.663)	(0.674)
Chair ex_CEO	2.325***	-0.417***
	(0.000)	(0.008)
Performance	-0.014	0.024***
	(0.224)	(0.000)
Bank size	1.636***	0.052
	(0.000)	(0.181)
Capital	-0.158*	-0.024
	(0.100)	(0.341)
Growth opportunities	-0.003	0.001
	(0.247)	(0.764)
Country dummies	Yes	Yes
N	69	67
Adj-R^2	0.937	0.990

The p-values of coefficient significance are in brackets and asterisks indicate significance at the 1% (***), 5% (**) and 10% (*) levels, using a two-tailed test. Please refer to Appendix 4.1 for the definition of each variable.

Column (1), in Table 4.5, reports the results for the determinants of bank risk as specified by Equation (4.1) in the crisis period. The results remain the same as with those reported in Column (1), in Table 4.3, except that the coefficients on *CEO power* and *Performance* variables are no longer statistically significant.

Column (2), in Table 4.5, reports the results for the determinants of bank risk as specified by Equation (4.1) in the non-crisis period. The findings remain unchanged comparatively to those presented in Column (1), in Table 4.4.

In summary, the qualitative findings with respect to the main explanatory variables (with the exception of the *CEO power* variable, in the crisis period) and the control variables (with the exception of the *Performance* variable also in the crisis period) remain unchanged, providing robustness for our results.

4.4.3.2 Winsorisation

In order to consider the (potential) impact of outliers on our results, we winsorise all the variables at the 1st and 99th percentile. Specifically, this means that for each variable: (1) all observations below the 1st percentile are replaced by the value corresponding to the 1st percentile and (2) all observations above the 99th percentile are replaced by the value corresponding to the 99th percentile. In effect, the 1st and 99th percentile become the minimum and maximum values.

Table 4.6 reports the estimation results of Equation (4.1), the main equation,[75] using 3SLS and applying winsorisation in the crisis and non-crisis periods, respectively, in Columns (1) and (2).

[75] To save on space, we omit the estimation results of Equations (4.2) and (4.3), they are nevertheless available upon request.

Table 4.6 – Determinants of bank risk-taking in the crisis period and non-crisis period – 3SLS and winsorisation

The table presents 3SLS regression results of bank risk-taking in the financial crisis and before the financial crisis (2006) with winsorisation.

Variable	(1) Bank risk (crisis period)	(2) Bank risk (non-crisis period)
Board independence	-0.016**	-0.004**
	(0.022)	(0.023)
Board size	-0.289***	-0.014
	(0.010)	(0.436)
CEO power	-2.210*	0.059
	(0.069)	(0.767)
Institutional ownership	0.017**	0.010***
	(0.016)	(0.000)
Risk committee	0.370	-0.003
	(0.339)	(0.978)
CRO	-1.624	-0.378
	(0.569)	(0.549)
Chair ex_CEO	2.029***	-0.429***
	(0.000)	(0.001)
Performance	-0.023**	0.020***
	(0.027)	(0.000)
Bank size	1.491***	0.039
	(0.000)	(0.236)
Capital	-0.105	0.005
	(0.221)	(0.812)
Growth opportunities	-0.002	0.001
	(0.496)	(0.138)
Country dummies	Yes	Yes
N	69	67
Adj-R^2	0.937	0.990

The p-values of coefficient significance are in brackets and asterisks indicate significance at the 1% (***), 5% (**) and 10% (*) levels, using a two-tailed test. Please refer to Appendix 4.1 for the definition of each variable.

Column (1), in Table 4.6, shows the results for the determinants of bank risk as

specified by Equation (4.1), in the crisis period, with winsorisation. The results remain the same as those reported in Column (1), in Table 4.3, except that the coefficient on the *Capital* variable (a control variable) is now not statistically significant. Thus, the previous results presented in Table 4.3 remain valid since only bank capital now has no impact on bank risk-taking.

Furthermore, in Column (2), in Table 4.6, presents the results for the determinants of bank risk as specified by Equation (4.1) in the non-crisis period, with winsorisation. The estimation results corroborate our previous findings, reported in Column (1), in Table 4.4.

In short, the qualitative findings regarding the main explanatory variables, the main variables of interest, and the control variables (with the exception of the *Capital* variable, in the crisis period) remain unchanged, confirming the robustness of our results.

4.5 Conclusion

The global financial crisis that began unfolding in 2007 has highlighted the importance of the need for robust bank risk-taking supervision in order to ensure their safety and soundness. Key characteristics of strong risk oversight at banks include the board of directors and risk governance mechanisms.

Given the relevance of studying bank risk-taking (in particular, European banks which are much less analysed) and the emphasis on governance mechanisms, it is important to examine the relationship between these mechanisms (and other corporate factors) and risk-taking by banks during the crisis period.

Consistent with the expectations, in a simultaneous equation framework, using the 3SLS estimation method, our results support the existence of such significant relation. In particular, we find that board independence, board size and CEO power are negatively related to bank risk-taking in the financial crisis. These results suggest that: (1) the role of the independent directors is performed as a trade-off between the interests of shareholders (who prefer more risk), regulators and other public authorities (who prefer less risk and safer policies) and it is particularly sensitive to regulatory

recommendations/requirements, (2) larger boards decrease risk-taking due to the availability of more human capital and greater moderation in the decision-making process and (3) CEO power also reduces bank risk-taking, consistent with the idea that bank managers exhibit risk aversion due to their non-diversifiable wealth, which may be aggravated by the form of their compensation. Thus, such governance mechanisms are important determinants of risk-taking by European banks. Regarding ownership structure, we also find that institutional ownership positively affects risk-taking, meaning that institutional shareholders encourage bank managers to take more risk. However, contrary to our expectations, the risk governance mechanisms are not associated with bank risk-taking. Also, we find that the existence of a Chairman that is an ex-CEO, past performance, bank size and capital influence risk. Our main findings remain unchanged using 3SLS, 2SLS as well as 3SLS when winsorisation was performed on all variables, with the exception of the *CEO power* variable, which coefficient loses statistical significance, using 2SLS estimation method.

Using the simultaneous equations approach, due to the bi-directional relationship between risk and board structure reported in existing literature, we also identify the determinants of board independence and board size. Banks with high stock return volatility, larger boards, more capital, high growth opportunities and older CEOs are associated with more independent boards, while larger banks, more diversified and whose CEO has longer tenure tend to have less independent boards. Considering specifically the relationship between board independence and risk-taking, we find that as risk increases the board independence also increases, which in turn leads to bank risk-taking reduction. Said differently, as risk grows banks are encouraged to incorporate more independent directors given that more independent boards lead to less risk-taking. Furthermore, more independent boards, larger and more diversified banks are associated with larger boards, while banks with a high-capital ratio and high growth opportunities have smaller boards.

Additionally, we replicate the regression of simultaneous equations system in the non-crisis period (more specifically the year immediately before the financial crisis) in order to analyse whether the influence of the governance mechanisms and other bank specific factors is subject to contextual contingencies. If it is the case then the impact will be different depending on the macroeconomic conditions. The results show that

such influence is not the same during and before the financial crisis. In the non-crisis period we find that board size, CEO power, bank size and bank capital are not significant in explaining risk-taking. Also, the influence of past performance and the current chairman who is ex-CEO is in the opposite direction.

Regarding board independence and board size we also find deviations compared to the crisis period. Alternatively to the 3SLS estimation method, when applying the 2SLS estimation method and the 3SLS with winsorisation our main results remain unchanged.

Overall, the findings of our study imply that bank internal governance mechanisms are important determinants of bank risk-taking but that their effectiveness is sensitive to the economic period.

Appendices

Appendix 4.1 – Variables definitions

Variables	Definitions	Measurement period	Data sources
Bank risk	Standard deviation of the daily bank stock returns.	January 2006 to December 2006 (non-crisis period); July 2007 to December 2008 (crisis period)	Datastream
Board independence	Percentage of independent directors, that is, the number of independent board directors on the board divided by board size.	December 2006 (non-crisis period); (average) December 2007/December 2008 (crisis period)	BoardEx
Board size	Total number of directors serving on the board of the bank.	December 2006 (non-crisis period); (average) December 2007/December 2008 (crisis period)	BoardEx
CEO power	A dummy variable equal to 1 if the CEO is also the Chairman, 0 otherwise.	December 2006 (non-crisis period); December 2007/December 2008 (crisis period)	BoardEx; Annual Reports
Institutional ownership	Percentage of shares owned by institutional investors.	December 2006 (non-crisis period); (average) December 2007/December 2008 (crisis period)	Thomson Financial
Risk committee	A dummy variable equal to 1 if the bank has a risk committee, 0 otherwise.	December 2006 (non-crisis period); December 2007/December 2008 (crisis period)	BoardEx; Annual Reports
CRO	A dummy variable equal to 1 if the CRO is a board member, 0 otherwise.	December 2006 (non-crisis period); December 2007/December 2008 (crisis period)	BoardEx; Annual Reports
Chair ex_CEO	A dummy variable equal to 1 if the current Chairman is ex-CEO, that is, if he/she has previously served as CEO, 0 otherwise.	December 2006 (non-crisis period); December 2007/December 2008 (crisis period)	BoardEx; Annual Reports
Performance	Past buy-and-hold stock returns.	January 2005 to December 2005 (non-crisis period); January 2006 to December 2006 (crisis period)	Datastream
Bank size	Natural logarithm of the bank's market capitalisation.	December 2006 (non-crisis period); (average) December 2007/December 2008 (crisis period)	Datastream

Appendix 4.1 – Variables definitions *(cont.)*

Variables	Definitions	Measurement period	Data sources
Capital	Bank capital, computed as the ratio of total equity to total assets.	December 2006 (non-crisis period); (average) December 2007/December 2008 (crisis period)	Datastream
Growth opportunities	Market-to-book ratio, i.e., ratio of the market value of equity to the book value of equity.	December 2006 (non-crisis period); (average) December 2007/December 2008 (crisis period)	Datastream
Bank age	Number of years since the bank was listed in the Datastream database.	December 2006 (non-crisis period); (average) December 2007/December 2008 (crisis period)	Datastream
Diversification	Measure of revenue diversification of Stiroh and Rumble (2006) which is calculated as 1-(squared share of net operating revenue from net interest sources plus squared share of net operating revenue from non-interest sources).	December 2006 (non-crisis period); (average) December 2007/December 2008 (crisis period)	Datastream
CEO tenure	Number of years the CEO of the bank has served as CEO	December 2006 (non-crisis period); (average) December 2007/December 2008 (crisis period)	BoardEx; Annual Reports
CEO age	Bank CEO's age in years.	December 2006 (non-crisis period); (average) December 2007/December 2008 (crisis period)	BoardEx; Annual Reports

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CHAPTER 5

CONCLUSIONS

5 CONCLUSIONS

This chapter contains the general conclusions of the thesis, organised according to the three papers. We also discuss the research contributions and policy implications, limitations and provide some suggestions for future research.

5.1 General conclusions

In the wake of the 2007-2008 financial crisis, corporate governance mechanisms in the banking industry have received heightened attention. Motivated by the renewed interest in the effectiveness of such mechanisms, especially the increased scrutiny of board-level governance at banks, we investigate the impact of corporate governance on the European banking sector in the context of the global financial crisis. Because of the special nature of financial services, most academic papers exclude financial firms from their data and focus on the governance of non-financial firms (Adams, 2012; de Haan and Vlahu, 2016). Banks have unique features that affect and interact with corporate governance mechanisms (John et al., 2016) and during the financial meltdown several economists and policymakers, amongst others, have criticised the governance of banks and in particular the board of directors. For the Basel Committee on Banking Supervision (BCBS) "*effective corporate governance is critical to the proper functioning of the banking sector and the economy as a whole*" (BCBS, 2015, p. 10).

The first paper, presented in Chapter 2, focuses on the impact of several characteristics of the board of directors on the performance of banks during the 2007-2008 financial crisis. In the search for explanations on the huge fall of the stock market capitalisation of many banks worldwide, we investigate whether, and to what extent, the board of directors, one of the main corporate governance mechanisms, impacted on the performance of banks during the more recent financial turmoil. The financial crisis has raised several questions with respect to the corporate governance of banks and it is important to know how the governance of banks affects their performance (de Haan and Vlahu, 2016). We mainly focus on the board of directors because they play a vital role in achieving effective governance and failures associated to it have often been

highlighted. Given that as a monitor the board supervises the managers and as an advisor it provides advices, opinions and direction moving forward, the role of the board should be particularly important in a crisis. In accordance with this, our findings show that the characteristics of the supervisory board really matter in the financial crisis given that, as we observed, they affect the performance of banks. Our evidence shows that more independent and busier supervisory directors decrease the performance of banks during the crisis, suggesting that independent directors may not have an in-depth bank-specific knowledge and that busier directors do not devote enough time and attention on each individual board, compromising the fulfilment of their duties and confirming the *Busyness Hypothesis*. The opaqueness and complexity of banks require more time and effort from directors in order to effectively fulfil their roles. These findings are in line with previous literature such as Muller-Kahle and Lewellyn (2011), Erkens et al. (2012), Pathan and Faff (2013) and Méndez et al. (2015). Additionally, we find that supervisory directors' experience in the banking sector, gender and age diversity increase the performance of banks during the crisis. Banking experience of the supervisory directors is beneficial for banks. The fact that banks with supervisory directors who have banking experience performed better during the crisis suggests that, for these directors, the cost of acquiring bank-specific information is relatively low. We also conclude that diversity matters. Gender and age diversity create value, which is consistent with the idea that female board members and heterogeneity on age offer diverse and valuable viewpoints, perspectives and work styles. Our conclusion provides support to the advocates of more diversity at board-level namely an increased inclusion of female board representation. Also, according to the BCBS "*board members should have a range of knowledge and experience in relevant areas and have varied backgrounds to promote diversity of view",* an understanding *"of the legal and regulatory environment*" and "*have sufficient time to fully carry out their responsibilities*" (BCBS, 2015, p. 13). In addition, we construct an index of the quality of governance based on the regulation or regulatory recommendations concerning the characteristics of the board and we conclude that the quality of governance positively influences the performance of banks during the crisis period. Overall, our results show that the performance of banks during the financial crisis depends on the quality of their governance and particularly on the characteristics of their boards.

The second paper, presented in Chapter 3, analyses the determinants of European banks' bailouts following the 2007-2008 financial crisis. Since the onset of the global financial crisis, given the imminent collapse of many banks, governments worldwide have launched unprecedented and costly bailout packages. The massive public assistance (and the huge amount of State aid) provided to banks, justify the analysis of the determinants of the likelihood of banks being bailed out. The findings obtained allow us to conclude that a set of features of the board, bank risks and also bank-level and country-specific banking sector variables, affect the likelihood of bailouts in the European banking sector. Robust to several checks and additional tests, we find that banks with supervisory board members who have banking experience and longer tenure, as well as those with less busy supervisory directors are less likely to be bailed out. Our results indicate that banking experience provides a better understanding of the dynamics and complexity of the banking sector activity and its regulatory environment. Considering the special attributes of banks, boards with longer tenure are in a better position to effectively monitor and provide valuable advice, being able to timely detect signs of severe problems and so, potentially avoiding bailouts. Moreover, serving on several boards distracts supervisory directors from their duties, thereby increasing the likelihood of bailouts. This finding confirms the *Busyness Hypothesis* and is in accordance with previous studies related to financial distress, financial statement fraud, governance problems and subprime lending (Beasley, 1996; Elloumi and Gueyié, 2001; Berberich and Niu, 2011; Muller-Kahle and Lewellyn, 2011). Also, the BCBS emphasised the obligation of individual board members to dedicate sufficient time to their mandates and to keep abreast of developments in banking (BCBS, 2015). In addition, we find that credit and liquidity risks increase the probability of a bank being bailed out. Both, the existence of large amounts of non-performing loans and the consequent decline in the banks' loan portfolios and insufficient liquidity are detrimental to the health of the banking system. Finally, we also conclude that some bank-level and country-level variables have predictive power. For instance, the existence of an audit committee decreases the likelihood of bailouts. On the contrary, the level of concentration in the banking industry, in line with the "concentration-fragility" view, as well as international exposure and financial integration increase the

likelihood of bailouts. Greater financial freedom/openness may serve as a contagion channel in a crisis.

Given that the vulnerability of the banking sector during the crisis was, at least partially, associated with excessive risk-taking (e.g., Kirkpatrick, 2009; Fortin et al., 2010), the third paper, presented in Chapter 4, examines the impact of board structure, ownership structure, risk governance mechanisms and other bank-specific factors on bank risk-taking in the context of the financial crisis. Using a simultaneous equations approach, we show that board independence, board size and Chief Executive Officer (CEO) power decrease bank risk-taking. These findings suggest that: (1) independent directors are more sensitive to the regulatory compliance, taking an active role in disciplining and overseeing excessive risk-taking, (2) larger boards reduce risk-taking as the final decisions of larger groups reflect a compromise among opposing views and so, they end up selecting average projects whose performance tends to be more stable and (3) CEO power reduces risk-taking in order to protect his/her non-diversifiable wealth, being more risk-averse than shareholders. Regarding ownership structure, we conclude that institutional investors encourage managers to take more risk in an attempt to increase their wealth. Contrary to our expectation, we do not find evidence that risk governance mechanisms are associated with the risk taken by banks. This may be because the Chief Risk Officer (Chief Risk Officer) may not have enough knowledge/experience and/or access to all the information necessary to perform his/her duties well. We note that for the BCBS "*the CRO should have the organisational stature, authority and necessary skills to oversee the bank's risk management activities*" (BCBS, 2015, p. 26). Another interesting conclusion of this paper is that banks in which the Chairman has previously served as CEO take more risk. Additionally, we conclude that the influence of the governance mechanisms and other bank specific factors on bank risk-taking is contingent upon environmental conditions/economic context. Thus, such influence is not the same in stable and crisis periods.

In short, the thesis concludes that corporate governance, in fact, impacts on the European banking sector in three different dimensions: performance, bailouts and risk-taking behaviour.

5.2 Research contributions and policy implications

This research provides contributions for both academics and policymakers. It will help to include relevant findings in a coherent and robust body of knowledge regarding the corporate governance of banks in the context of the severe global financial crisis. It shows the relevance of the role the corporate governance mechanisms in the European banking sector, since the European context is sparsely analysed and even more scarce is the existence of European cross-country studies.

The first paper contributes to the literature on the relationship between board characteristics and bank performance, in the "special" context of the financial crisis. It permits the identification of the features of boards before the crisis that really influence the performance of banks during the crisis and thus, contributes to the understanding of the role of the boards in the crisis period. We add to the existing literature by showing that bank-level differences in boards are relevant in determining variations in bank performance during the crisis. Therefore, board configuration matters. Additionally, the research extends the literature by examining a broad set of board characteristics such as experience, education, various dimensions of diversity, busyness and activity. By demonstrating that differences in board configuration cause differences in performance, this paper has policy implications not only at bank-level but also at country-level. At bank-level, bank managers and shareholders should devote special care and attention to the structure of the board, as, for instance, shareholders have their wealth closely linked to the bank value. At country-level, this study offers guidance to regulators and other public authorities regarding the development and improvement of corporate governance codes and best practices recommendations.

The second paper contributes to the literature by identifying the factors that influence the likelihood of bailouts of European banks following the financial crisis, helping governments to predict and avoid/reduce costly bailouts. Unlike the vast majority of the literature that analyses financial distress or bankruptcy, we focus on a particular and different dimension of financial distress, that is, bailouts. In fact, the literature lacks a deep and detailed examination of the factors that determine bailouts in the context of the financial crisis. Thus, this study aims to fill such gap. It provides evidence that different characteristics of the board and types of risk at bank-level, as

well as country-level variables help to explain bailouts. The special role of banks and the negative externalities associated with their failure make banks' agency problems costlier for the economy at large (de Haan and Vlahu, 2016; John et al., 2016) thus, requiring government interventions worldwide. The findings of this paper have, therefore, policy implications as they offer contributions to regulators, governments and other public authorities especially as regards ongoing financial reforms. Being concerned with avoiding costly bailouts that impact on the whole economy and generate taxpayer dissatisfaction, the findings obtained can help policymakers in the process of introducing new recommendations and legal rules, so as to prevent/moderate future collapses and, therefore, promote the health of the financial system.

The third paper contributes to a crucial area of the literature that seeks to assess how corporate governance influences risk-taking. To prevent new crises, it is vital to understand the factors that influence risk-taking (Jiraporn et al., 2015) and this study identifies a set of factors that explain risk-taking by European banks in the context of the financial crisis. Given that excessive risk-taking by banks can lead to instability of the banking system (John et al., 2016), there has been considerable academic and regulatory interest in how to mitigate bank risk-taking behaviour in recent years (Srivastav and Hagendorff, 2016). Thus, the results of this paper contribute to the process of reforming bank governance in order to constrain potentially undesirable risk-taking by banks and ensuring the stability of the financial system. Also, at bank-level, the findings of this study are important for bank managers and shareholders. Additionally, this paper shows that the impact of governance mechanisms and other factors on risk-taking depends on environmental circumstances and is particularly relevant in the crisis period.

5.3 Limitations and future research

One limitation of this research is the small sample size. We restrict our sample to banks that are covered by Boardex, a data source for academic research concerning the board of directors. While BoardEx is the leading database on boards of publicly listed firms, only a limited number of European banks are covered in the database. The fact is

that, since in this research we are only interested in European banks and Boardex only provides information relating to listed companies, the size of the sample is not very large. Another limitation is that, although some literature, in the context of the financial crisis, argues that executives at banks had poor incentives, the structure of the compensation (variable versus fixed) was not analysed in this research. This was because it was not possible to obtain sufficient information regarding executive remuneration like annual bonuses, options, equity and salary.

Bank governance has been a topic of intense policy and academic discussions in recent years. Many policy documents and academic research have outlined recommendations about bank governance. Accordingly, we provide suggestions and directions for future research on corporate governance in banks. Further research should investigate other characteristics relating to the "quality" of the board, in the context of the financial crisis, such as board networks regarding political and lobby connections. Network structure is relevant in determining the outcome of many important social and economic relationships (Jackson and Watts, 2002). For example, networks play a fundamental role in accessing information. So, the application of this analysis to the boards of banks seems to be a logical and interesting extension. Heavily regulated firms place a high value on being able to influence public decisions (Adams et al., 2010) and consequently, politically connected boards can add value. Also, these connections should be particularly important in crisis periods. The role of various forms of political connectedness should, therefore, be investigated in future research. In addition, lobby connections potentially affect the functioning of the board (e.g., on strategic decision-making) and, thus, may be analysed in future research. Furthermore, in this research we use as proxy for board education, the number of qualifications of the supervisory directors and not the level of qualifications, due to problems with missing data for many of them, using our main database BoardEx. However, using other sources of information, such as annual reports, and although a considerable time-consuming task, it may be possible to obtain detailed information on the degree of qualifications (undergraduate, post-graduate, MBA, PhD or other) obtained by each director, the area of expertise and the university where each of the directors got his/her academic degree. An interesting question to answer is if there is a relationship between university rankings and director rankings. If this is true, then the university where the director did

his/her academic degree signals his/her quality. According to the above suggestions, our investigation leaves substantial room for future research.

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